UNITED STATES DEPARTMENT OF ENERGY

STATUS REPORT TO CONGRESS ON CURRENT AND PROPOSED ACTIVITIES UNDER THE CLEAN ENERGY TECHNOLOGY EXPORTS (CETE) INITIATIVE

April 2001

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EXECUTIVE SUMMARY

This annual status report is prepared in response to Senate Report 106-395 on the fiscal year 2001 Energy and Water Development Appropriations Bill. The report language requested that U.S. Government agencies work cooperatively to promote the export of U.S. clean-energy technologies through the creation of an interagency working group, a private sector advisory panel, and a 5-year strategic plan. A requirement for an annual status report was also established.

This status report is divided in two sections with appendices. The first section describes current progress with regard to the Senate Report requirements. The second section is organized on an agency-by-agency basis to describe baseline data of current efforts to facilitate clean-energy technology exports.

Section I: Status of Current and Delineation of Proposed Activities

The three co-chairs (the Departments of Energy (DOE) and Commerce (DOC), and the U.S. Agency for International Development (USAID)) have begun work on the requirements set out in Senate Report 106-395.

- The three co-chairs held their first meeting on January 31, 2001. A meeting of the full interagency Clean Energy Technology Export Working Group (CETEWG) is planned for some time in the near future.
- DOE is continuing to explore options for an advisory panel, including using Federal Advisory Committee Act (FACA) regulations, and other types of consultative mechanisms that would permit the CETEWG to obtain information and views from the private sector on a wide range of issues pertaining to the export of clean-energy technologies.
- DOE has prepared a draft outline for a 5-year strategic plan.
- Lastly, this first Annual Report was prepared in consultation with all participating agencies.

Section II: Baseline Data by Federal Agency of International Activities in Clean Energy Technology Exports

Between August 1998 and January 2001, DOE negotiated several key international clean-energy technology agreements with foreign nations. At present, approximately 95 countries have signed agreements with DOE covering clean-energy technology principles. DOE program offices and research laboratories, in support of these agreements, have performed cooperative research, development, and deployment activities.

USAID is working to promote clean-energy projects abroad through several major programs, including: The *Energy Efficiency Program* to increase efficiency of energy production and end-use; the *Renewable Energy Program* to promote environmentally sustainable energy generation from renewable sources; the *Clean Energy Program* to promote the development of technical solutions through the creation and utilization of appropriate policy frameworks, economic incentives, investment capital, private sector partnerships, and capacity building; and the *Urban Pollution Reduction* program to improve municipal pollution management.

In March 2000, DOC launched an International Clean Energy Initiative (ICEI) to link U.S. companies with foreign markets to facilitate sales and dissemination of clean-energy technologies, products, services, and clean fuel sources. Over the period September to December of 2000, the ICEI resulted in four Clean Energy Trade Missions in which twenty-three companies participated. In March 2001, a fifth Clean Energy Trade Mission took place in Russia with a focus on district heating equipment and efficiency.

The Environmental Protection Agency (EPA) is promoting a variety of technologies, practices, and policies, with the goal of reducing greenhouse gas emissions associated with the energy supply sector through its Clean Energy Initiative. EPA has a three-pronged strategy that includes: (1) influencing markets for renewable energy; (2) working with state and local governments to develop policies that favor clean-energy; and (3) facilitating combined heat and power (CHP) and other clean "distributed generation" technologies in targeted sectors. This effort initially targets a handful of state markets. As EPA gains success, it will expand its efforts to other markets.

The Export-Import Bank (Eximbank), through a variety of credit mechanisms, has actively promoted the sale of U.S. clean-energy technology products overseas. Eximbank's environmentally beneficial export program consists of a proactive business development strategy and enhancements offered to existing bank programs.

Most Overseas Private Investment Corporation (OPIC) power projects are fueled either by natural gas or renewable energy sources. In addition, approximately 43 percent (by capacity) of OPIC-supported fossil fuel-fired plants utilize combined-cycle technology, which is the most energy efficient type of fossil fuel-based power plant. Since OPIC projects are required to meet high environmental performance standards that generally exceed host country environmental requirements, OPIC-supported power projects are generally among the cleanest and most efficient projects in the developing world.

The U.S. Trade and Development Agency (TDA) is an independent Federal agency that helps U.S. companies develop commercial opportunities in emerging markets. To achieve this mission, the agency invests in feasibility studies, training grants, technical assistance, orientation visits, and deal-making conferences. Two major areas of focus for TDA in clean-energy technologies have been electricity and power projects and oil and gas development projects. In 2000, TDA invested in 76 new energy and power activities and, over its 18-year history, TDA has provided more than $55 million for feasibility studies and related activities in support of American involvement in oil and gas development projects around the world. Total U.S. exports associated with these investments exceed $2.5 billion.

Section I: Status of Current and Delineation of Proposed Activities

A. Background

Senate Report 106-395, on the FY 2001 Energy and Water Development Appropriations Bill, directed that an interagency working group be created to facilitate private sector efforts to launch clean-energy technologies into international markets by improving the government's role in clean-energy research, development, demonstration, and deployment (ERD3). The language calls for the establishment of an advisory panel of private sector representatives, the preparation of an annual report to be submitted to Congress by March 1st, and the completion of a 5-year strategic plan to be submitted by June 1, 2001. Technologies covered in the report language include end-use efficiency, fossil, renewable, and nuclear. The Departments of Energy (DOE) and Commerce (DOC) and the Agency for International Development (USAID) have begun implementation of the FY 2001 Senate Energy and Water Development Appropriations Bill report language on international Clean Energy Technology Exports (CETE). Current progress and anticipated activities for the CETE initiative are described below.

B. The Interagency Working Group

The report language calls for the creation of an interagency working group. It is envisioned that this working group will serve as a coordinating forum for international energy technology promotion and trade. The interagency Clean Energy Technology Exports Working Group (CETEWG) will be co-chaired by representatives of DOE, DOC and USAID. Other agencies to be represented in this body include; the Departments of State and Treasury, Environmental Protection Agency, Export-Import Bank, Overseas Private Investment Corporation, Trade and Development Agency and other departments and agencies, as appropriate.

The Department to Energy is proposing that representation on the CETEWG should be at the Under Secretary level for DOE and DOC, the Deputy Administrator level for USAID, and at equivalent levels for the other departments and agencies. These leaders should meet every six months to review progress on the implementation of the program, and meet as often as required to resolve outstanding issues. At the working level, the proposal is to create an executive or technical committee representing staff from the three agencies.

> *Current Status*:
> At a meeting on January 31, 2001, the three co-chair agencies discussed the broad themes and direction of the CETE initiative and outlined a series of steps to implement the four program elements. A concept paper detailing how the initiative will be implemented has been updated and will be further updated as directions and ideas change. Additionally, a draft "Terms of Reference" paper for the initiative has been prepared and is presented in Appendix 1.

Planned Activities:
CETEWG participating agencies have been contacted about current progress on the initiative and were provided both background materials (including the concept paper and terms of reference) and an opportunity to provide input into this report. A meeting of the full interagency group, including all the agencies identified in the report language, is being planned for the near future.

C. The Advisory Panel

Congress has asked that an advisory panel be established. This advisory panel may be comprised of representatives from private-sector companies, academic institutions, non-governmental organizations and other private interests, as appropriate.

Current Status:
Several options were explored to fulfill the request for the establishment of a private-sector advisory panel. Consideration was given to utilizing the U.S. Energy Association (USEA), DOE's Laboratory Energy Research and Development Working Group (LERDWG), the Department of Commerce's Trade Promotion Coordinating Committee (TPCC), and the DOE Secretary of Energy Advisory Board (SEAB).

DOE is continuing to explore options for an advisory panel, including using Federal Advisory Committee Act (FACA) regulations, and other types of consultative mechanisms that would permit CETEWG to obtain information and views from private sector companies, academic institutions, non-governmental organizations and other private interests on a wide range of issues pertaining to the export of clean-energy technologies. Through one of the varieties of consultative mechanisms, the CETEWG will engage in a private sector dialogue to obtain their views and advice.

Care will be taken to select participants that have been active in clean-energy technology export activities and have pertinent experience relating to U.S. clean-energy export regulations in order to provide insight into government-created bottlenecks, requirements, or lack of interagency cooperation that hamper deployment of these important technologies.

Planned Activities:
DOE will be exploring further establishing a group which could provide advice and input to the strategic plan.

D. The Strategic Plan

The report language requests the drafting of a strategic plan in consultation with the advisory panel. The report states that the focus of the strategic plan should be to analyze technology, policy, and market opportunities for clean-energy technology export related activities.

Current Status:
DOE has produced an outline that includes broad language on objectives, background analysis, potential strategies to support objectives, performance measures, and process (Appendix 2). Additionally, The CETEWG is beginning the process of creating a strategic plan that is responsive to the report language and provides an informed roadmap of benchmarks for the future deployment of clean-energy technology exports by the United States. The schedule for the development and delivery of the strategic plan will be determined in consultation with congressional staff, the CETEWG, and the advisory panel.

The 5-year strategic plan should develop an operating framework and outline an action agenda. A critical element of the strategic plan will be setting baseline metrics of U.S. market concentration in clean-energy technologies in foreign countries. Another useful measure of progress may be data that compares U.S. clean-energy technology exports to that of other nations whether in specific countries, regions, or overall. In future annual reports, these data points will provide a baseline against which to measure progress toward established goals.

Planned Activities:
In the near term, further work will be performed to expand upon the various elements of the draft strategic plan. The current draft balances both a desire for a roadmap to guide report expectations with the need for full and open participation by all U.S. Government entities and private sector interests that are part of the CETE initiative. Future meetings and consultations are planned to codify and enhance the current draft.

E. The Annual Report
The report language calls for an annual report to be submitted to the Congress by March 1 of each year. The annual report will provide a synopsis of U.S. international ERD3 highlighting how agencies can work together to promote clean-energy technology exports in international markets.

Current Status:
This first annual report focuses on setting baseline data regarding U.S. Government efforts to promote clean-energy technology exports in foreign countries (Section II). The present report provides a broad overview of activities and the beginnings of baseline data for several key U.S. agencies.

Planned Activities:
Preparation of the next annual report will begin 90 days before March 1, 2002. The second report will provide a measure of progress against the baseline contained in the first report and will detail progress toward the goals outlined in the 5-year strategic plan. In the future, it is hoped that current efforts summarized in Section II will be expanded.

F. Conclusion

The Departments of Energy and Commerce, and the Agency for International Development have begun work on all elements contained in Senate Report (103-395), on the FY 2001 Energy and Water Development Appropriations Bill: the working group, the advisory panel, the strategic plan, and the March report. We look forward now to begin concentrating our efforts on the 5-year strategic plan as required by the report language.

Section II: Baseline Data by Federal Agency of International Activities in Clean Energy Technology Exports

A. U.S. Department of Energy and Laboratories

Office of International Affairs (IA)

The Office of International Affairs serves as the primary advisor to the Secretary and the Department of Energy (DOE) on international energy and science and technology policy matters. With respect to clean-energy, IA represents DOE on international clean-energy policy, trade and investment, science and technology issues, and the export of clean-energy-related commodities and technologies. IA is responsible for the coordination, negotiation, and implementation of international clean-energy science and technology agreements; develops and manages strategies, objectives, and policies affecting DOE relations with foreign countries; and manages energy-led bilateral and multilateral technical and ministerial exchanges. This work provides the basis for cooperative development and demonstration of international Energy Research and Development, Demonstration, and Deployment (ERD3) of clean-energy technologies.

The annual IA budget is approximately $400,000, excluding salaries, travel and overhead. As a result, IA leverages DOE science and technology funding through policies aimed at enhancing cooperative international ERD3. In this capacity, IA is managing the Clean Energy Technology Exports (CETE) initiative for DOE. This initiative arose in response to the conclusions and recommendations of the report prepared by the President's Committee of Advisors on Science and Technology (PCAST), *Powerful Partnerships: The Role of the Federal Government in International Cooperation on Energy Innovation* (PCAST II, June 1999).

Although most international clean-energy-related agreements are negotiated by IA and then implemented by DOE's program offices, IA does directly coordinate several important clean-energy efforts. IA manages DOE's participation in the Russian American Fuel Cell Consortium (RAFCO), which has as its primary goal the promotion of U.S. fuel cell technology in foreign markets. IA also coordinates DOE's Memorandum of Understanding (MOU) with the Russian Academy of Sciences, in which fuel cell technology development also plays a large role. Additionally, IA designed and created the joint DOE – Inter-American Development Bank (IADB) Hemispheric Sustainable Energy Fund (HSEF). The fund is managed by IADB, in coordination with IA (for review and approval), to prepare and define sustainable energy projects throughout Latin America and the Caribbean.

At present, approximately 95 countries have signed agreements with DOE covering clean-energy principles. These agreements promote cooperation in the development and deployment of clean-energy technologies and help create receptive import markets in which these technologies can compete. Between August 1998 and January 2001, IA helped negotiate, and supported program office participation in, the following clean-energy technology agreements.

Asia

China

DOE signed a Statement of Work with the Ministry of Science and Technology in China in 1998 to develop an energy efficient building demonstration project. The project will demonstrate, in part, the role that U.S. energy efficient and renewable energy technologies can play in reducing the demand for energy in China. The Department of Commerce (DOC) is coordinating private sector activities associated with this project.

IA organized the U.S. energy delegation to the January 2000 U.S.-China Forum on Environment and Development. At that meeting, the Energy Policy Working Group endorsed a number of new cooperative initiatives, including energy efficiency cooperation, such as electric motor systems (DOE efforts helped spur a major United Nations Development Programme (UNDP) grant for a pilot program in China this fall) and agreement on a U.S.-China Renewable Energy Forum and Study Tour (successfully held in April 2000 and leading to a Chinese request for a Clean Energy Symposium in Beijing now being planned for August 2001).

In April 2000, DOE extended its cooperative relationship with China in the areas of energy efficiency and renewable energy technology development and utilization for a period of five years. IA assisted in the coordination of cooperative activities to strengthen the use of energy efficient and renewable energy technologies and increase market opportunities for U.S. technology vendors.

Four annexes to a protocol on fossil energy were signed on December 7, 2000, covering the areas of power systems (clean coal technology, fuel cells, and integrated gasification combined cycle systems); oil and gas; energy and environmental technologies; and climate science.

India

DOE's National Energy Technology Laboratory (NETL) has been engaged with India's Solar Research Center (SRC) since 1993. The principal objectives were to help strengthen joint U.S./India capacities for energy technology innovation, promote technologies to increase energy conservation, and promote technologies for a cleaner energy supply. Under the Memorandum of Understanding between NETL and SRC, concluded in 2000, DOE anticipates a resumption of and enhanced cooperation in renewable energy development and utilization between DOE and SRC, as well as other institutions in the U.S. and in India. This, together with a resumption of fossil energy cooperative projects, focused primarily on R&D capacity building to address combustion and environmental issues related to coal-fired power generation in India, is anticipated to have a beneficial local and global environmental impact.

Japan

The Agreement on Cooperation in Research and Development in Energy and Related

Fields provides an umbrella for ongoing U.S.-Japan cooperative activities in several program areas, including fossil energy, energy efficiency and renewable energy and global climate change.

The Americas

Mexico

IA coordinated the development of two new annexes to the U.S.-Mexico Agreement on Energy Cooperation that broadened energy cooperation with Mexico. In October 1998, the U.S. and Mexican Secretary of Energy signed an annex to promote "Environmental Cooperation in the Field of Hydrocarbons" and in December 1999, they signed an annex to promote "Cooperation in the Field of Clean Fossil Energy Technologies." These activities complement the successful on-going cooperation in the fields of energy efficiency and renewable energy under other annexes. Under the cooperation, DOE, together with USAID, provided technical assistance for energy efficiency standards and labeling, the development of local Energy Services Companies, and the use of renewable energy technologies for rural economic development.

IA proposed and established the U.S. - Mexico High Level Working Group on Sustainable Energy. The Working Group draws upon the numerous energy efficiency, renewable energy, and clean-energy activities under existing bilateral energy agreements.

Brazil

DOE and Brazil's Ministry of Mining and Energy (MME) have agreed to expand energy cooperation under the 1997 "Implementing Agreement for Cooperation in the Area of Energy Technology." The areas identified for expanded cooperation include energy efficiency, renewable energy, natural gas and oil policy implementation, energy regulatory policy, energy data collection and analysis and coal and power systems.

Bolivia

IA strengthened bilateral cooperation with Bolivia on sustainable energy development. This cooperation included capacity building on climate change issues, natural gas development and rural electrification. IA facilitated the development of a village power electrification project that uses solar panels and state of the art technology to electrify a school in Porvenir near the Noel Kempff Mercado National Park.

Russia

In March 1999, DOE signed a Science and Technology Memorandum of Understanding with the Russian Academy of Sciences. Two Implementing Arrangements under the MOU were signed in May 2000. A Third Implementing Arrangement was initialed in January 2001, which will provide for cooperative work in the area of fuel cells.

In October 1999, a joint coal statement was signed to expand the cooperation of the Coal Working Group to assist Russian companies in obtaining World Bank technical assistance funds and in identifying commercial opportunities for clean coal technologies.

Under this agreement, DOE has initiated a mine equipment certification project through the U.S. Department of Labor's Mine Safety and Health Administration and Russian counterparts.

Europe

Baltics

IA initiated a project with Poland and the Baltics to develop sustainable financing mechanisms for public energy efficiency projects that will reduce both emissions and costs for federal and municipal governments.

France

IA signed agreements with France in advanced nuclear reactor science and technology with the French Atomic Energy Commission (CEA) and the application of emerging technologies with the French Ministry of Defense.

Turkey

IA, in conjunction with the Office of Fossil Energy, organized a regulatory tour for DOE officials to visit Turkey and for Turkish officials to visit the United States to learn more about clean combustion technologies. This will lead to a larger market for U.S. technologies and help build a market for Central Asian gas supplies.

United Kingdom and Spain

DOE has expanded the Science & Technology cooperation between its laboratories and their counterparts in the United Kingdom and Spain by signing new Memoranda of Understanding. The new MOUs allow for the exchange of information and personnel, organization of seminars and workshops, and joint projects in a wide range of energy Science & Technology fields, including fossil energy, renewable energy, energy efficiency, radioactive waste management, fusion, high energy and nuclear physics and basic energy sciences.

Africa

IA and OPIC signed a Memorandum of Cooperation to promote financing of sustainable energy projects in Africa. DOE and OPIC will create a U.S./Africa Sustainable Energy Program to establish a financing program that will lower the investment costs of sustainable energy projects in Africa through grant/loan packages to U.S. not-for-profit entities, non-governmental organizations (NGOs), and small business entities or cooperatives developing sustainable energy projects in Africa.

South Africa

IA continued the work of the Sustainable Energy Committee of the U.S./South African Binational Commission, which includes cooperative efforts to streamline South African regulations to facilitate U.S. investments in oil, gas, coal, renewable energy and energy efficiency, as well as nuclear safety and nonproliferation efforts. At the February 1999 Committee Meeting, the Secretary signed a Joint Statement recognizing the need to focus

on the development of clean-energy as an integral element in addressing concerns about the global and local environment with South Africa's Minister of Minerals and Energy. In April 2000, the Ministers agreed to form a bilateral workshop group on clean-energy to implement the Joint Statement.

Nigeria

In August 1999, IA negotiated a Memorandum of Understanding on Energy Policy that was signed by the Secretary and Nigeria's Ministry of Power and Steel. Under the MOU, DOE is working with Nigeria to transform its energy sector and extend energy services to all citizens. DOE has provided technical assistance to implement a village-scale, solar-powered, water purification demonstration project.

Middle East

In July 1999, IA developed an Implementing Arrangement with the Ministry of Electricity and Energy of the Arab Republic of Egypt for Cooperation in Energy Technology. In February 2000, the Secretary and Egypt's Minister of Electricity and Energy signed Annexes on renewable energy and fuel cells.

Multilateral Fora

Asia-Pacific Economic Cooperation (APEC)

At the APEC Energy Minister's Meeting in May 2000, Ministers approved a Clean Energy Statement committing to use energy in an environmentally sustainable way and recognizing that sustainable energy development policies are intricate elements of strategies to reduce greenhouse gas emissions.

Hemispheric Energy Initiative (HEI)

In 1994, at the largest summit ever to take place in the Western Hemisphere, 33 democratically elected Heads of State met at the first Summit of the Americas in Miami. Since 1994, through a series of projects, workshops, meetings, and information sharing, the HEI has become a key conduit for multilateral energy cooperation in the Hemisphere.

IA organized and hosted the Hemispheric Energy Ministers Conference in New Orleans, LA on July 28-30, 1999. This conference facilitated a public/private dialogue on strategies to enhance investment in clean-energy, opportunities for regional energy market integration, and continued transition to a market-oriented business climate. During the conference, Ministers or their representatives from 30 countries participated in the Fourth Hemispheric Energy Ministers Meeting under the Summit of The Americas process. At the meeting, the Ministers approved the *Joint Statement on the Clean Development and Use of Energy*, the *New Orleans Declaration*, and the *Energy Business Forum of the Americas for the Hemispheric Energy Initiative.* Mexico hosted the 5th Hemispheric Meeting of Energy Ministers in February of 2001.

International Energy Agency (IEA)

The IEA is an energy forum for industrialized countries and is comprised of 25 member countries of which the U.S. is both a member and one of its principal financial supporters. U.S. membership, financial support and the chairmanship of key IEA committees, has translated into significant U.S. influence in IEA activities. In recent years, the IEA has been involved in energy cooperation with developing countries and in analysis of energy sector responses to the challenges of climate change. DOE efforts with these countries have emphasized energy efficiency, alternative sources of energy (renewables) and energy sector reforms. The next Energy Ministerial meeting is scheduled for May 2001 at the IEA Headquarters in Paris, France.

Office of Energy Efficiency and Renewable Energy

The Office of Energy Efficiency and Renewable Energy (EERE) activities generally are driven by the goals and objectives of the domestic R&D program managers, are aimed primarily at U.S. markets, and are conducted most often with partners of the International Energy Agency (IEA) and other multi-national organizations and with other U.S. agencies. Facilitation of technology deployment, which is driven by U.S. Government strategic interests and opportunities, typically involves technical assistance, training and capacity building, and support for policy and regulatory reform. Energy and environmental security, climate change, and trade and market development are the principal drivers behind the technology deployment activities. The activities respond to Presidential and Secretarial initiatives involving the outcomes of binational commissions, bilateral technology cooperation agreements, and climate change programs.

There are two specific appropriations within the EERE budget for international ERD3: the International Renewable Energy Program, which supports the international acceptance and use of U.S. renewable energy technologies and the U.S. Initiative on Joint Implementation (USIJI); and the International Market Development Program, which supports the activities of the Committee on Energy Efficiency, Commerce and Trade (COEECT). The total appropriations for these two activities has been about $7 million annually.

The USIJI program is a pilot project that supports the use of market-based strategies and flexible mechanisms to meet the goals of the United Nations Framework Convention on Climate Change (UNFCCC). The pilot program has shown the potential for joint U.S.-foreign country projects to reduce global greenhouse gas (GHG) emissions at a substantially lower cost than projects in the United States, where cost-based energy pricing already has encouraged substantial investments in clean-energy technologies. The USIJI has accepted 52 projects in 26 countries since 1995, with the potential of reducing more than 300 metric tons of carbon dioxide (CO_2) at a projected cost of $3.17/ton. United States industry has committed approximately $400 million for financing these projects to date. The largest programs are related to climate change issues. There are modest activities in transportation, energy-intensive industries, and buildings.

The COEECT activities were initiated by the Energy Policy and Conservation Act (EPCA) of 1992. The activities of COEECT are directed by an interagency working group, consisting of

representatives from 15 Federal agencies and chaired by the Secretary of Energy. The goals of COEECT are to coordinate actions and programs supporting the export of energy efficiency products and to assist the U.S. energy efficiency industry in competing in international markets.

The efforts of COEECT were instrumental in establishing the Energy Efficiency Unit in the European Bank for Reconstruction and Development (EBRD). As a result, energy efficiency became a key priority for loans made through EBRD. The energy services sector of the U.S. energy efficiency industry reports that the rate of international investment in energy efficiency services grew from near zero in 1992 to more than $30 million in 1997, five years after the creation of COEECT. Workshops on energy efficient technologies have been held in Latin America and Asia and COEECT has had some success in opening access to the vast potential markets for energy efficiency products and technologies in China. A financial resources guide has been developed for energy efficiency firms interested in export markets. Market assessments in Latin America, Asia, Southeast Asia, and Eastern Europe have been a priority of COEECT.

EERE also has pursued its ERD3 goals through the Technology Cooperation Agreement Pilot Project (TCAPP), working closely with and with substantial funding from USAID and EPA. The TCAPP program was launched in 1997 and is managed by the National Renewable Energy Laboratory (NREL). TCAPP is organized to help developing countries design and implement actions to attract investment in clean-energy technologies that will meet their economic development goals, while mitigating greenhouse gas emissions. A strategic and collaborative approach is employed to facilitate large-scale international investment in clean-energy technologies consistent with sustainable development needs of developing countries.

Voluntary partnerships are being facilitated by TCAPP between the governments of Brazil, China, Egypt, Kazakhstan, Korea, Mexico, and the Philippines, the private sector, and the donor community on a common set of actions to advance implementation of clean-energy technologies. Three goals are sought by TCAPP, namely, to:

- foster private investment in clean-energy technologies that meet development needs and reduce greenhouse gas emissions;
- engage host country and international donor support for actions to build sustainable markets for clean-energy technologies; and
- establish a model for international technology transfer under the UNFCCC.

To ensure that industry views are incorporated into the strategy, structure, and implementation of TCAPP, the Business Council for Sustainable Energy (BCSE) has developed a business network of companies and trade groups representing the renewable energy, energy efficiency, electric utility, transportation, engineering, and natural gas industries. The BCSE network assists with the design of investment actions, including policy reforms, investment solicitations, and investment conferences. Feedback is also provided on country technology cooperation framework documents and market barriers in participating countries. Information on regulatory and policy changes and market opportunities emerging from TCAPP activities is distributed to the business network

Office of Fossil Energy

In general, the Office of Fossil Energy (FE) capitalizes on government-to-government interactions to establish the foundation for international ERD3. One model is to initially focus on policy and strategy issues, with participation by U.S. industry (e.g., the China Oil and Gas Industry Forum). A second approach is to establish detailed information exchanges on policy, regulatory, technology, and economic issues to increase the interest in pursuing collaborative ERD3. This latter approach has been used successfully with Brazil, for example, related to the potential to deploy clean coal technologies. Extensive interchanges over a five-year period have positioned U.S. industry to capture up to $10 billion for clean coal technology projects during the next decade.

For countries with strong technical capabilities, a main objective in cooperative ERD3 is to leverage funds by establishing two-way flows of information of mutual interest. This process has worked with Japan and Venezuela. In the latter instance, active exchanges have occurred for about 20 years, initially focused mostly on heavy oils and more recently on natural gas. In other cases, where the U.S. may provide the Bulk of the information, efforts are made to involve U.S. industry to promote environmental, energy security, or economic benefits by encouraging use of better technology and practices. Cooperative efforts with China, Egypt, Guatemala, India, Turkey, Russia and Korea are examples of this approach.

Based on successful experiences with India and Korea, FE sees long-term ERD3 relationships with developing countries as among the most productive and beneficial to U.S. interests. Considerable effort is ongoing to establish the framework for similar relationships with China.

Approximately $2.7 million in the FE budget are allocated to international ERD3 activities, not including the $1.5 million appropriation for coal-fired power plants and clean fuels as part of the ICEI for fiscal year 2001. About 30% of the base budget is dedicated to cooperative efforts with China. Multinational activities on coal, natural gas, and greenhouse gas emissions constitute about 45% of the budget. The remaining 25% of the budget supports cooperative activities with Australia, Canada, Estonia, Japan, and Norway. Carbon sequestration and oil shale technologies dominate these activities.

The National Energy Technology Laboratory (NETL) has several international ERD3 model projects encompassing science and technology cooperation based on information exchange, interagency technical assistance, interagency cooperation, interagency technical assistance, commercial project support and advocacy. Included among these projects is a large effort in India, the Greenhouse Gas Pollution Prevention Project, supported by the U.S. commitment to the Global Environment Facility, a collaboration between the United Nations and the World Bank that established a financial mechanism for implementing the global conventions agreed to at the 1992 United Nations Conference on Environment and Development including the UNFCCC. The funding is provided by USAID, and the work focuses heavily on improving the efficiency of coal-fired power plants. USAID is also funding a project through FE's Albany Research Center to improve the efficiency of Indonesian power plants.

Office of Nuclear Energy, Science, and Technology

The Nuclear Energy Research Initiative (NERI) is a dominant part of the ERD3 programs sponsored by the Office of Nuclear Energy, Science, and Technology (NE). The NERI mission is to address the key issues affecting the future use of nuclear energy and to preserve the U.S. leadership in nuclear science and technology through long-term R&D activities. The primary R&D areas are proliferation resistant reactor and fuel technologies; advanced reactor designs and applications, including low-power systems for special applications; advanced nuclear fuel technologies; new techniques for management of nuclear wastes; and fundamental scientific cross cutting research related to computational analysis, materials, and chemistry. The NERI program was funded at $22.5 million in fiscal year 2000. The NERI program involves a number of international participants, including Canada, France, Israel, Italy, Japan, Russia, and the United Kingdom, as well as the OECD Nuclear Energy Agency.

A major element of the DOE component of the ICEI is the International Nuclear Energy Research Initiative (I-NERI). The fiscal year 2001 appropriation for I-NERI is $6.8 million, representing more than 80% of the ICEI funds awarded to DOE. All I-NERI projects will be cost shared by foreign countries so that the full DOE appropriation will be dedicated to activities conducted by U.S. researchers. The I-NERI mission is to address key issues affecting the future of nuclear energy and its global deployment through bilateral and multilateral research collaborations. The principal R&D areas are:

- next-generation reactor designs with higher efficiency, lower cost, and improved safety;
- advanced nuclear fuels and fuel-cycle technologies;
- innovative technologies for plant design, fabrication, construction, operation, and maintenance; and
- fundamental nuclear science.

The NE effort to define Generation IV nuclear reactor designs that will be proliferation resistant, highly economical, operate at enhanced safety levels, and minimize waste production contains an international component, labeled the Gen IV International Forum. This Forum is exploring international cooperation through a top-down policy group and a bottom-up technical experts group. Five meetings were held in 2000. Prospective members of the Gen IV International Forum include Argentina, Brazil, Canada, France, Japan, Korea, South America, and the United Kingdom.

The experience of NE in international cooperation on ERD3 suggests that there is strong interest by other countries in collaborating with the U.S. Such cooperation helps stimulate new ideas for addressing common problems, fosters cooperation on advanced technologies, leverages resources, gains access to unique facilities and expertise, and maintains U.S. influence in international discussions on nuclear energy issues.

Office of Science

The Office of Science (SC) has a large portfolio of international collaboration in all of its major elements. One SC office has a long-term energy goal, the Office of Fusion Energy Sciences. The work of this group, which is highly international in scope, is scientific in nature and supports technological research advancing the science underlying fusion. The objective is to strengthen the basis for our understanding of fusion energy as a future energy source. This work includes experiment, theory and computation, and supporting technology development.

The DOE Fusion Energy Sciences program is closely integrated into the international fusion program involving Western Europe, Japan and Russia, along with a number of other smaller contributors. This allows the world's best minds in fusion to address the formidable challenges presented by this science and the associated technologies. It also allows for the potential of sharing the design, construction and use of the highly specialized facilities necessary to conduct the research. The world fusion research funding is well in excess of a billion dollars annually and provides a framework within which the U.S. program (1/4B$) can work to optimize the value of its research efforts. Formal bilateral collaboration takes place under agreements with the European Union, Japan, Russia, China and Korea. Multilateral collaboration also exists, primarily under the auspices of the IEA.

The other offices within SC are generally focused on basic research in the physical, biological and environmental sciences. Some aspects of their work relate indirectly to energy supply and/or end use efficiency, such as research on carbon dioxide sequestration, high temperature and low temperature materials, climate change, microbial remediation, and biomass. However, the bulk of the work of SC is fundamental science rather than applied technology, covering such topics as the human genome, radiological research, high energy and nuclear physics, and basic energy sciences, as well as fusion energy sciences noted above. The time horizon for this leading to significant industrial participation and/or commercial exploitation is generally long. Again, international collaboration is quite common through both formal agreements and informal laboratory to laboratory arrangements.

Office of Civilian Radioactive Waste Management

The Office of Civilian Radioactive Waste Management (RW) is responsible for the disposal of spent nuclear fuel from U.S. commercial nuclear power facilities and high-level radioactive waste from defense activities. Management of these nuclear materials transcend political boundaries and RW has the following four international goals:

- obtain information useful to the RW program in a timely, cost-effective manner;
- share information to further the planning of geologic repositories;
- promote the understanding of waste management programs; and
- promote consensus on waste management concerns.

Funding for international activities within the RW budget is approximately $0.6 million in FY 2001 to support bilateral agreements and waste management activities in the International Atomic Energy Agency, Nuclear Energy Agency, etc. To date, bilateral agreements have been

signed with Canada, France, Japan, Spain, Sweden, and Switzerland. Bilateral agreements are being developed with Finland, the Russian Federation, and the United Kingdom

An International Center for Geologic Repository Science and Technology (ICGRST) is being proposed by RW. The overall objective of ICGRST is to:

- enhance geologic repository science for the disposal of high-level radioactive waste and/or spent nuclear fuel;
- promote cooperative research and provide results to participants;
- exchange views and experiences to enhance public outreach;
- provide a forum to discuss repository regulatory, safety assessment, and validation issues; and
- allow for the consolidation of resources to address member economy concerns.

The proposed scope of work will include scientific, technological, regulatory, and institutional issues of importance to other nations pursuing development of geologic repository systems for high-level radioactive waste. The initial membership of the ICGRST would include representatives from China, Japan, South Korea, Taiwan, and the United States.

Additional funding of $2.5 million was provided in the FY 2001 NN Defense Nuclear Nonproliferation appropriation "for geologic repository cooperation research and planning." RW is using these funds to implement agreements with the Russian Academy of Sciences and MINATOM for work on geologic repository science and planning projects in Russia.

Office of Policy

Only a small fraction of Office of Policy (PO) activities are focused on international issues. The PO has a staff of 45 people with an annual budget of about $7 million, of which only about $0.1 million is allocated to ERD3 projects. Four major functions comprise the PO responsibilities: policy development, policy analysis, policy coordination, and policy communication. One of the PO goals is to engage the international community in discussions and actions involving energy-related environmental issues through multilateral and bilateral negotiations and agreements. In this regard, PO has the lead responsibility for the Department to support the U.S. negotiations of the United Nations Framework Convention on Climate Change (UNFCCC). This is an area in which PO has distinguished itself since the U.S. ratified the UNFCCC, more commonly referred to as the Rio Treaty, in October 1992. PO has made significant contributions to the development of Departmental and U.S. policy positions taken in these negotiations.

As a result of its responsibilities, PO is in a unique position within DOE to provide objective analysis and to coordinate cross-cutting activities or issues. Within the international ERD3 arena, PO can serve both analytical and coordination functions. The PO can provide analyses of technology and energy policies as well as provide the capacity for others to perform comparable analyses through, for example, the Markal model. Examples of analyses that might be useful for improving international ERD3 include the effects of deregulated energy markets on energy R&D; energy policy in the context of other fiscal, monetary, and trade policies; impacts of

technology diffusion; barriers to technology deployment; limits of technology in solving energy challenges; and policy options for enhancing technology development, demonstration, and deployment.

Although not directly tied to international research, development, demonstration and deployment, UNFCCC negotiations and related activities have impacts on the rate and pattern of technology development and diffusion, particularly in developing countries and those with economies in transition. A good example of such an activity, supported by the U.S., on which PO has lead responsibility, is the Climate Technology Initiative, or CTI. Twenty-three OECD countries formed this activity in 1995, with the mission of supporting the UNFCCC objective by facilitating the more rapid development and diffusion of climate-friendly technologies and practices. Since energy is the most rapidly growing sector of most developing and transition countries, the opportunities for making more economically and environmentally informed choices are nearly without limit. These opportunities for technology diffusion go well beyond their basic energy and environmental components in that, besides creating domestic business prospects, they provide jobs, alleviate poverty, promote economic and social stability, etc., in developing and transition countries that will begin to reduce pressure on scarce ODA resources, peace-keeping forces, and related temporary and costly means of securing regional stability.

The PO experience in coordinating domestic science and technology policies in support of DOE missions should be a strong foundation for similar activities in international ERD3. Past activities involving fundamental energy-related science, mission-driven energy R&D, interactions with the DOE national laboratories, and international science and technology cooperation are relevant to potential PO roles in international ERD3.

Summary of DOE Funding for International ERD3

Estimated recent annual DOE expenditures on international ERD3 are about $22 million. An approximate distribution of expenditures by program office is shown in Figure 1.

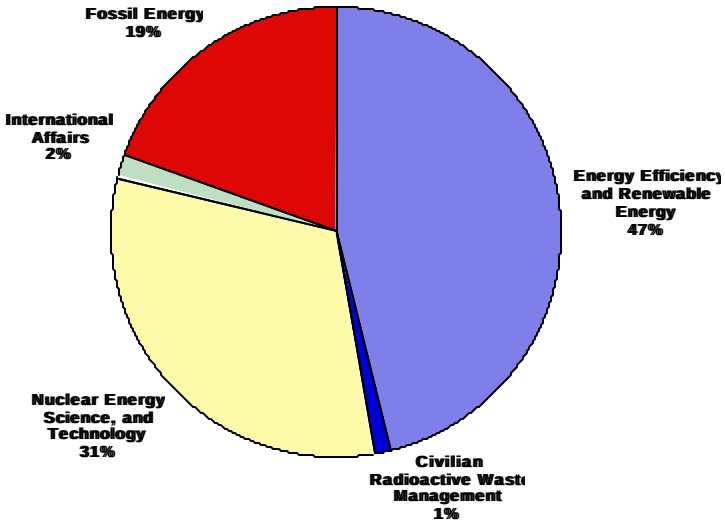

Figure 1. Estimated Recent Annual Expenditures by DOE on International ERD3 by Program Office.

Non-DOE-Funded Activities at the DOE National Laboratories

The DOE national laboratories are conducting non-DOE-funded international ERD3 activities that engage individuals and organizations in many countries including, for example, Australia, Argentina, Brazil, Canada, Chile, China, Egypt, Germany, Guatemala, Hungary, India, Indonesia, Japan, Kazakhstan, Korea, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Sri Lanka, South Africa, Sweden, Turkey, Ukraine, and the United Kingdom. The sponsors are diverse including Federal agencies, such as USAID, the U.S. Environmental Protection Agency (EPA), the U.S. Department of Defense, the U.S. Trade and Development Agency, foreign governments and R&D institutions, and domestic and foreign private industry. The budgets range from a few thousand dollars to a million dollars or more per year.

DOE-approved agreements, such as Cooperative Research and Development Agreements (CRADA), technology licenses, and user facilities aid in establishing collaborative relationships and are attractive to potential foreign collaborators. Experience in cooperating internationally on ERD3 suggests that in certain situations new technologies may be less expensive to demonstrate abroad than in the United States. Moreover, international partners may be more receptive than U.S. partners. If successful, the technologies may subsequently find domestic markets as conditions change. Testing sustainable solutions in real world environments is extremely important. To be successful in deploying new technologies, both economic and environmental sustainability must be achieved. Strong customer pull is key. Considerable benefit can be obtained by not working solely through government-to-government relationships. Private sector involvement is critical to accomplishing truly successful technology deployment.

Some exceptional successes have been realized in international ERD3 involving the DOE national laboratories. An example of a cost-effective cooperative effort in the early 1990s is the creation of the Beijing Energy Efficiency Center (BEEC). This activity was conducted under the Assisting Deployment of Energy Practices and Technology (ADEPT) program operated by the DOE Office of Environmental Policy. The BEEC subsequently convinced the Chinese government to invest $50 million in efficient lighting technologies. Later, the BEEC established the Energy Conservation Project, supported by the World Bank, which is now attempting to create an ESCO in China as well as an energy-efficient refrigerator program.

The projects summarized here are intended to represent projects funded from non-DOE sources. However, DOE is a funding partner in some of the activities. The total funding level for these projects is approximately $29 million. The distribution of funding among the DOE national laboratories is shown in Figure 2.

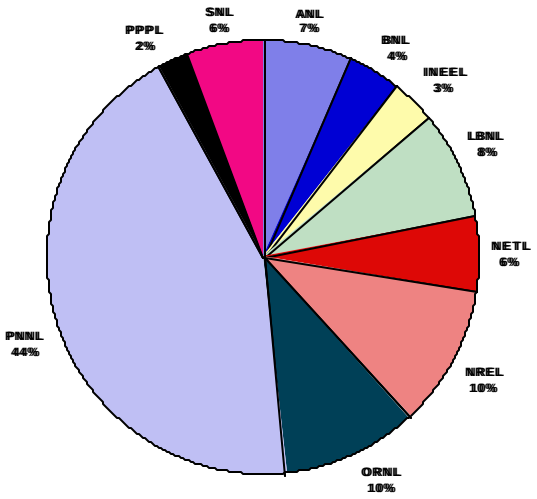

Figure 2. Estimated Distribution of Annual Non-DOE Financial Support for International ERD3 at the DOE National Laboratories.

Ames Laboratory

Ames Laboratory has a small international R&D program in advanced materials consisting of three projects. Turbine blade degradation and embrittlement is one of the applications. The total annual funding level is about $0.1 million.

Argonne National Laboratory

An expanding set of activities in international ERD3 is present at ANL. Key topical areas include restructuring in energy markets, training programs in the analysis of electrical gird expansion and demand forecasting and in energy and environmental analysis, and climate change issues. The climate change work is focused on clean development mechanism assessments and greenhouse gas mitigation. The total annual ANL funding level is about $1.9 million for fiscal year 2001, up from $1.4 million in fiscal year 1999.

Brookhaven National Laboratory

The BNL has seven international ERD3 projects and one large project related to environmental threats of military activities in the Arctic. Most of the ERD3 efforts are related to nuclear power plants, particularly control room design, regulatory training, and seismic testing of structures, systems, and components. The total annual BNL funding level is approximately $1.1 million.

Idaho National Engineering and Environmental Laboratory

The INEEL has completed an ongoing international ERD3 projects in approximately 40 countries. These projects encompass both energy and non-energy related activities. Bechtel and

BWXT, the parent companies of the management and operations contractor for INEEL, provide professional services in about 65 and 85 countries, respectively. About 10 projects are current or recently completed. Most of the recent energy-related projects involve nuclear ERD3. The total INEEL funding level for recent projects is less than $1 million.

Lawrence Berkeley National Laboratory

Multiple-project international ERD3 programs are conducted at LBNL in five topical areas: climate change; China energy efficiency, carbon scenarios, and policy analysis; efficiency standards and labeling; industrial technologies; and other bilateral assistance. Major funding sources include EPA, the Energy Foundation, USAID, the United Nations Foundation, and Shell Corporation. The total annual LBNL funding level in fiscal year 2000 was about $2.3 million.

Lawrence Livermore National Laboratory

The LLNL has a very small international effort in modeling of market penetration of energy technologies. The annual LLNL funding level is about $0.02 million.

Los Alamos National Laboratory

No non-DOE-sponsored international ERD3 activities are reported at LANL.

National Energy Technology Laboratory

The NETL has eight major active international ERD3 projects. Other activities primarily involve information exchange. Approximately 50 percent of these projects involve ERD3 related to coal-fired power generation. Other topics include natural gas production from landfills, natural gas powered fuel cell technology, and greenhouse gas emission reductions from coal- and biomass-fired power plants. The total annual NETL funding level is approximately $1.6 million.

National Renewable Energy Laboratory

International ERD3 programs are concentrated in five areas at NREL: climate change; renewable energy in the Philippines; wind energy assessments; concentrating solar power in Southern Africa; and fermentation of wheat, oat, and barley straw in Sweden. The principal sponsors are EPA and USAID. The total annual NREL funding level for fiscal year 2000 was approximately $3 million.

Oak Ridge National Laboratory

Oak Ridge National Laboratory is presently engaged in four international ERD3 projects and one project providing technical assistance on management of the Panama Canal watershed. Most of the projects are environmental related, particularly urban air pollution and climate change. However, the largest project involves structural materials for fusion reactors. In addition, ORNL

has had nearly a 20-year relationship with USAID involving about 70 projects in 40 different countries. These projects have been focused largely on energy, environment, and natural resource topics. An evaluation of the lessons learned from this experience is underway. The total annual ORNL funding level international ERD3 is approximately $3 million.

Pacific Northwest National Laboratory

Three large international ERD3 programs are conducted at PNNL as well as a number of smaller projects. The Advanced International Studies Program; the Battelle Global Energy Technology Strategy Project; and the Alianza Program, a strategic alliance consisting of Battelle, the National Autonomous University of Mexico, the Mexican Petroleum Institute, and the Autonomous Metropolitan University, respectively, are the three large programs. The smaller projects involve global environmental monitoring. The total annual PNNL funding level is estimated to be about $12.5 million.

Princeton Plasma Physics Laboratory

The PPPL has one international ERD3 project involving Hall Thrusters for fusion reactors. The total annual PPPL funding level is about $0.6 million.

Sandia National Laboratories

Sandia National Laboratories has about 15 current or recent projects involving international collaborations. Some of these activities involve software technology licenses and others are non-energy related. Renewable energy, nuclear energy, and critical infrastructures are the topical areas for a majority of the energy-related projects. Two large projects involve photovoltaic applications in Mexico and training for physical protection of nuclear facilities, sponsored by USAID and IEA, respectively. The total annual SNL funding level is approximately $1.7 million.

Conclusions

A wide variety of activities in international ERD3 are currently in progress or planned. The overall level of effort sponsored by DOE is rather small, approximately $22 million annually, excluding nuclear fusion related work and activities sponsored by the National Nuclear Security Administration. Much of the DOE-sponsored work has been ongoing for some time. An estimated $29 million is received annually by the DOE national laboratories from non-DOE sponsors for international ERD3. As the result of these DOE and non-DOE-sponsored projects, many solid working relationships have been established in numerous countries involving a large array of partners and collaborators. Consequently, the past experiences of DOE and the DOE laboratories should allow informative lessons learned in international ERD3 to be compiled, including common characteristics of successful efforts as well as conditions leading to failures.

The current international ERD3 programs appear to be well aligned with the DOE strategic energy goals. While some strong collaborations between U.S. industry and the DOE laboratories have been achieved, many additional opportunities for private industry/DOE laboratory collaborations in international ERD3 appear to be present.

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USAID CLEAN ENERGY ACTIVITIES

Contained below is a brief summary of clean-energy activities of USAID's Office of Energy, Environment and Technology (EET).[1] The document covers the following topics:

1. Overview of EET and its clean-energy activities;
2. Summary of EET clean-energy funding;
3. Mechanisms used by EET to coordinate its clean-energy activities;
4. Descriptions of clean-energy projects; and
5. Success stories.

1. Office of Energy, Environment and Technology

The Office of Energy, Environment and Technology works toward the goal of increasing environmentally sound energy production and use in order to achieve and maintain social and economic progress in developing countries. EET's sustainable energy efforts address energy efficiency, renewable energy and clean power development through technological innovation, training and capacity building. EET taps U.S. expertise to promote private- sector initiatives in developing countries and encourages adoption of more effective energy policies and regulatory frameworks to stimulate trade and investment in environmentally sound energy technologies. Its services include activities that support increased energy efficiency, increased production and use of renewable energy, clean-energy production and use, and reduced urban pollution.

The *Energy Efficiency program* seeks to strengthen non-governmental organization (NGO) capacity to understand and implement energy saving projects such as school lighting and shifting industrial energy use to off-peak hours. Program work includes fostering the growth of private energy service companies (ESCO) and NGO energy efficiency centers. Another key area is influencing the "enabling environment" to permit increased public and private participation in making cleaner and more efficient energy investments. Improved energy efficiency is an important variable of macro-economic growth, energy generation capacity and pollution in any given country, particularly in developing states. Energy efficiency often reduces the need for countries to build new power plants; it is also an important method of reducing pollutants and easing the weighty economic burden of energy imports. Energy efficiency also increases the competitiveness of an industry or country while at the same time creating jobs.

[1] This is a compendium of clean energy activities undertaken by the Office of Energy, Environment and Technology, within USAID's Global Environment Center. Given the highly decentralized nature of USAID, it is not within the scope of this report to document all USAID clean energy activities, including those undertaken by regional bureaus and missions (field offices). Efforts are underway at USAID to begin a systematic inventory of all USAID-sponsored clean energy activities.

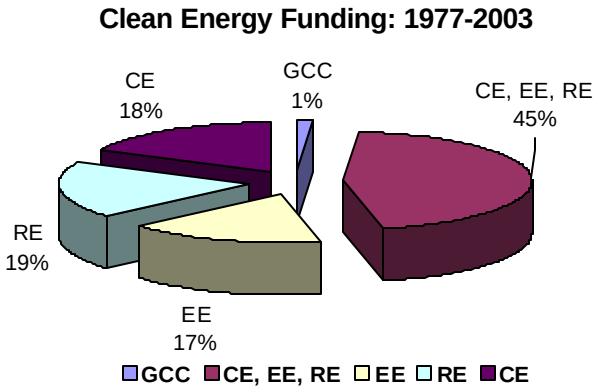
The *Renewable Energy Program* benefits all segments of society. Environmentally sustainable energy generation from renewable sources fosters economic development to help alleviate poverty and improve human health in urban and rural areas. Renewable energy-based rural electrification programs bring electricity to the rural poor and create jobs. Renewable energy technologies frequently represent the least-cost option for satisfying human needs, while using indigenous resources that do not contribute to global climate change. Renewable energy systems can be used to pump water for domestic and community uses, including crop irrigation, livestock watering and power water purification systems. Renewable energy projects light schools and community centers, as well as provide power for radios, television sets and videocassette recorders for weather reports, distance learning and entertainment. Renewable energy electrifies public health clinics, allowing modern diagnostic equipment to be used, vaccines to be refrigerated and utensils to be sterilized. Renewable energy projects power new commercial enterprises and expand existing ones.

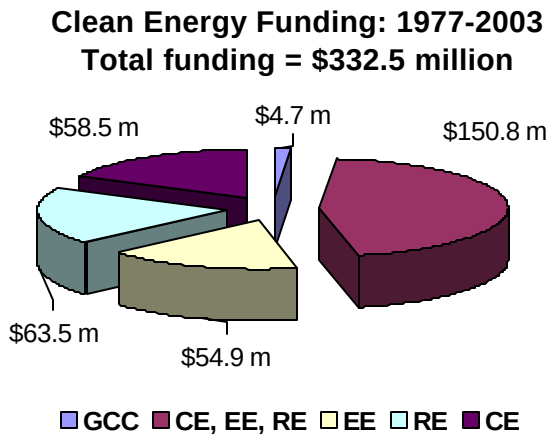
The *Clean Energy Program* promotes the development of technical solutions coupled with appropriate policy frameworks, economic incentives, investment capital, private-sector partnerships and capacity building. The program fosters private investment in clean-energy projects by supporting pilot projects, supporting technical assistance and assisting with regulatory reform. Focus areas of the program include electric vehicle use, regional electricity trade, power pool development and increased power plant efficiencies.

Urban pollution threatens both the health and productivity of urban populations and natural ecosystems, which in turn undermines sustainable development. The purpose of the *Urban Pollution Reduction* program is to improve the living conditions of urban residents through improved municipal pollution management. The USAID provides technical assistance, training and exchange of information that enables host countries to improve their ability to successfully manage the urbanization process. Program beneficiaries are residents of targeted municipalities who are particularly vulnerable to urban pollution, such as industrial wastes, untreated sewage and contaminated water supplies.

2. Summary of EET Funding for Clean Energy Activities

The EET spearheads USAID's efforts to help developing countries and economies in transition design effective new strategies in order to tap private capital and talent, thereby meeting growing energy demand. The EET promotes free-market policies and more efficient power production, energy conservation and private-sector participation in the energy sector. From 1977-2003, total funding for EET clean-energy activities is estimated at $332 million. Funding breakdowns EET programs—clean power, renewables and energy efficiency—are presented in the charts below. In addition, working with MDB and non-MDB donors and the private sector, EET has leveraged significant public and private investments to finance clean and sustainable energy activities. EET's spending on clean-energy activities—an estimated $332 million (from 1977-2003)—has leveraged, at a 1:9 ratio, more than $2 billion for environmentally sustainable clean-energy activities.





Source: Congressional Presentations, 1977-2003

3. EET Mechanisms for Coordinating Clean-energy Activities

EET works with the public and private sector through contractual, cooperative and interagency agreements, and letter grants for coordinating its international clean-energy activities. EET implements programs through various contractors and cooperators. EET implements programs and projects through private-sector firms such as the Advanced Engineering Associates International, Bechtel, PA Consulting, CORE, the Academy for Education Development, and International Institute for Education. EET also works with U.S. Government Agencies, principally the Department of State, Environmental Protection Agency and Department of Energy. EET implements projects through U.S. laboratories such as the National Renewable Energy Laboratory, Oak Ridge National Laboratory, Sandia and the Lawrence Berkeley National Laboratory. EET also works through cooperative agreements with the U.S. Energy Association, Winrock International, the Business Council for Sustainable Energy, the Alliance to Save Energy, E&CO and the International Institute for Energy Conservation. EET also works via letter grants with the Organization of American States, Inter-American Development Bank and the World Bank Global Environment Facility. EET's cooperative and interagency agreements and letter grants are described below.

U.S. Energy Association Cooperative Agreement II

This cooperative agreement focuses on the implementation of regional and country-specific programs related to regulation, environment and system reliability with an emphasis on climate change mitigation. Programs include exchange visits, summits and small workshops. Included in this program is a project to assess and implement specific projects in USAID-assisted countries that avoid, reduce and mitigate the climate change impacts of greenhouse gas emissions.

Oak Ridge National Laboratory Interagency Agreement

Oak Ridge National Laboratory (ORNL) provides assistance in program design, monitoring and evaluation, short-term technical assistance, and short-term staff support. More specifically, ORNL provides assistance in the areas of strategic planning and program development, program coordination, monitoring and evaluation, and technical support. Technical areas of support include clean-energy development, environmental policy making and institution building, global climate and environmental change, and regional sectoral vulnerabilities and impact assessments.

Winrock International Leader with Associates Agreement II

This agreement supports Winrock International in working to establish a network of Renewable Energy Program Support Offices (REPSO) to build local capacity in renewable energy, accelerate the commercialization of renewable energy and improve access to energy services in rural areas. Work was recently expanded to link the REPSO activities with those of four other organizations, forming the Non-Governmental Organization Renewable Energy Initiative (NGO/REI). NGO/REI activities reduce technical, financial, economic and institutional risks associated with renewable energy systems in order to encourage public and private sector investment in commercially proven renewable energy systems.

National Renewable Energy Laboratory Interagency Agreement

Under this interagency agreement, the U.S. Department of Energy/National Renewable Energy Laboratory provides services to assist USAID's Global Environment Center. These services include design, development, implementation and evaluation of activities that support USAID goals to promote renewable energy technologies and the reduction of greenhouse gas emissions to combat climate change. Technology Cooperation Agreement Pilot Project (TCAPP) activities are also pursued under this agreement.

World Bank/Global Environment Facility Grant

This grant (to the World Bank Renewable Energy Trust Fund) supports an existing staff assignment to the Climate Change Team within the World Bank's Environment Department. The primary purpose of this grant is to enhance environmentally sustainable development and renewable energy activities at the World Bank. The jointly funded (USAID/U.S. Department of Energy) assignment supports the following subtasks: (1) World Bank/Global Environment Facility strategic partnership for renewable energy and (2) application of carbon dioxide externalities in project design and selection.

Institutionalization of Renewable Energy in the Americas Initiative at the Organization of American States Grant

This agreement supports the institutionalization of Renewable Energy in the Americas (REIA) Initiative at the Organization of American States (OAS) in implementing sustainable energy projects throughout Latin America and the Caribbean. The activities under this agreement

provide energy policy and regulation support, technical assistance and trade promotion, and sustainable energy impact analyses. The agreement also funds the Technical Secretariat of REIA at the OAS.

E&Co Cooperative Agreement

This agreement, in concert with BUN Central America and PA Consulting Group (formerly Hagler Bailly, Inc.), supports 11 renewable energy activities in Central America. Eight of these activities focus on enterprise development, next state financing, capacity building and policy/regulatory reform; three of these activities are of a cross-cutting character and include the development and dissemination of targeted manuals on off-grid energy deployment models, greenhouse gas information for renewable energy entrepreneurs, and a monitoring and evaluation manual for renewable energy initiatives.

Renewable Energy Technical Support Interagency Agreement

This agreement supports Sandia National Laboratories in providing short-term technical advice to USAID-funded renewable energy projects. The activities under this agreement include short-term technical support to multilateral banks in the areas of renewable energy project analysis and technical support for rural-based renewable energy.

Alliance to Save Energy Cooperative Agreement

This agreement supports the Alliance to Save Energy in development of a series of energy efficiency activities in several countries, including India, Ghana and Ukraine. The Alliance has two primary objectives in this cooperative agreement. The first objective is to implement "macro-level" policy initiatives that will create a favorable policy climate, thereby reducing investment obstacles to energy efficiency products and services. The second objective enhances hands-on project implementation at the local level in order to develop innovative and replicable approaches to energy efficiency project implementation. The Alliance will work on specific activities including the CLASP program, which supports several components of collaborative labeling and appliance standards. The Alliance also supports activities for the implementation of a municipal-level water pumping efficiency program in Brazil, expansion of Industry Partnerships Programs in Mexico and Thailand, and enhancement of the Sustainable Cities Initiative in India, and the Energy Foundation in Ghana.

International Institute for Energy Conservation/CERF Cooperative Agreement

This agreement provides funding support for the International Institute for Energy Conservation (IIEC). The IIEC program aims to harmonize energy efficiency standards in Asia and Latin America, distribute second-hand equipment and promote initiatives to leverage financial support from the private sector. Primary countries for action include the Philippines, India, Brazil and Mexico.

Lawrence Berkeley National Laboratory Interagency Agreement

This interagency agreement draws on the expertise of the Department of Energy (DOE)/Lawrence Berkeley National Laboratory (LBNL), especially in areas of energy efficiency, environmental technologies and greenhouse gas emissions, to assist the Global Environment Center in achieving its strategic objective to increase the production and use of sustainable energy resources in developing countries. At USAID's request, DOE/LBNL will explore options for reductions of greenhouse gas emissions by improving the overall technical, financial and environmental performance of the energy and electric power sectors in key developing countries and to provide these countries with energy system alternatives. DOE/LBNL's activities will focus primarily on the USAID key countries of Mexico, Brazil and the Philippines.

Business Council for Sustainable Energy Cooperative Agreement

This cooperative agreement is part of the "Partnership for Business" project that focuses on USAID-targeted countries in order to promote the Agency's climate change agenda through clean-energy technologies. The Business Council works with USAID to encourage industry and government representatives to consider the adoption of clean-energy practices in several target markets. These markets include Brazil, India, Indonesia, Mexico, the Philippines, Russia, South Africa and Ukraine and regions such as Southern Africa, Latin America, Eastern Europe and Southeast Asia. In conjunction with the BCSE, USAID sponsors industry roundtables and seminars for developing country audiences on clean-energy issues. The USAID also supports the publication of industry-oriented position papers on the major issues related to market-based mechanisms to reduce greenhouse gas emissions. In addition, USAID collaborates with the Council's Private Sector Working Group to obtain industry input on U.S. Government clean-energy initiatives and to increase visibility of U.S. clean-energy companies in USAID target markets.

U.S. Environmental Protection Agency Interagency Agreement

The purpose of this agreement is to provide USAID's bureaus, missions and Regional Urban Development Offices (RUDO) with a mechanism to collaborate with the U.S. Environmental Protection Agency in developing activities in three areas: improved environmental management, global climate change and environmental information exchange and training. A sampling of proposed activities includes supporting workshops in Asia Pacific Economic Cooperation (APEC) countries on phasing lead out of gasoline, developing a municipal environmental management system in three cities in Mexico, and developing local government industrial partnerships in Mexico and the Philippines.

International Council for Local Environmental Initiatives Cooperative Agreement

Under this cooperative agreement, the International Council for Local Environmental Initiatives (ICLEI) will be working with three to five cities in both Mexico and the Philippines to reduce

greenhouse gas emissions through the implementation of a five milestone performance framework: (1) emissions inventory, (2) emissions forecast, (3) emissions reduction target, (4) emissions action plan, and (5) plan implementation and emissions monitoring. More than 200 cities worldwide are participating in ICLEI's Cities for Climate Protection program. ICLEI will also engage national government officials in these local efforts to demonstrate the role that municipal governments can play in implementing national climate action plans. Beginning in early 2000, the work will be replicated in India and South Africa.

4. Descriptions of EET Clean-energy Activities

Descriptions of past, current and future clean-energy activities are provided below. Each activity includes information on its location, duration, partners, and a brief description of the program or project.

Cities for Climate Protection Program
Location: Mexico, India, Indonesia, Philippines
Agency: USAID, DOE,
Partners: ICLEI
Duration: 1998-2003

The International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection Campaign (CCP), in partnership with state and national governments, is engaging cities in Latin America and Asia in an effort to reduce greenhouse gas emissions by increasing the use of energy efficiency and renewable energy technologies. Activities include developing a municipal inventory of local greenhouse gas emissions, setting targets for emissions reductions, developing local action plans for emission reductions, building local capacity, providing technical assistance, and networking with U.S. and other participating CCP cities.

Collaboration for Labeling and Standards Program
Location: Asia, Latin America
Agency: USAID
Partners: Alliance to Save Energy, International Institute for Energy Conservation, LBNL, In-country governments and standards organizations
Duration: 1999-2002
USAID provides expertise in the area of energy efficiency, particularly with regard to regional harmonization of standards and promotion of initiatives to leverage private-sector investment in Asia and Latin America.

Energy Efficiency, Standards, Economics and Policy Programs
Location: Global
Agency: USAID, DOE,
Partners: LBNL
Duration: 1997-2002

USAID and DOE support experts at LBNL to provide expertise in energy efficiency standards and in energy policy and economics related to greenhouse gas emissions in developing countries.

Energy Partnership Program
Location: Global
Agency: USAID
Partners: USEA
Duration: 1997-2002
USEA is implementing the Energy Partnership Program in Asia, Africa, Latin America, Central and Eastern Europe, and the former Soviet Union. The program's main objective is to provide a mechanism for the U.S. energy industry (utilities, regulators and policy makers) to transfer its experience in market-based energy production, transmission and distribution to its international counterparts, while providing U.S. participants with the opportunity to learn about the energy industry in another country. Regional program activities encompass such topics as regulation, the environment, system reliability and efficiency, renewable energy, customer service, and financial management, with an emphasis on climate change mitigation.

Moving Markets for Energy Efficiency (MMEE)
Location: Global
Agency: USAID
Partners: Bechtel Corporation, Core International
Duration: 1999-2000
The MMEE Project assesses the potential for increasing private sector investments in energy efficiency worldwide. The project team has selected three countries — Brazil, Egypt and India — as initial countries of focus given the untapped markets for energy efficiency these countries represent, among other reasons. USAID's approach to MMEE recognizes that implementation of energy efficiency in developing countries is constrained by a number of technical, economic, financial, regulatory and institutional barriers. The project has developed mechanisms to promote private-sector solutions and public-private partnerships and the related infrastructure to implement market-based strategies for key sectors in these USAID target countries. To support such activities, the project has developed "best practices" guidebooks, case studies, decision frameworks and other resource materials for government policy makers, regulators, financial institutions, utilities and private-sector entrepreneurs.

Renewable Energy Resources Program
Location: Global
Agency: USAID
Partners: Winrock International Renewable Energy Program Support Offices
Duration: 1999-2001
USAID is working with Winrock International to encourage activities that increase the use of environmentally beneficial renewable energy technologies to support sustainable economic development. This is accomplished by reducing technical, financial, economic, policy and institutional barriers to renewable energy and by increasing the investment in commercially

proven renewable energy technologies. This work is supported by a network of Renewable Energy Program Support Offices (REPSO) that work to build local capacity in renewable energy, accelerate its commercialization and increase access to energy in rural areas. These in-country facilities are managed by local institutions and are designed to provide the technical and financial assistance necessary to help identify, design, implement and evaluate renewable energy projects.

Sustainable Cities Initiative
Location: Global
Agency: USAID
Partners: Alliance to Save Energy, In-country municipal governments
Duration: 1997-2002
USAID supports the development of energy efficiency activities in several countries, including India, Ghana, Ukraine and Brazil. These activities focus on the development of municipally based efficiency programs using indigenous NGOs and U.S. efficiency experts.

Technology Cooperation Agreement Pilot Project (TCAPP)
Location: Brazil, Mexico, Egypt and the Philippines
Agency: USAID, EPA, DOE
Partners: NREL
Duration: 1997-TBD
The Technology Cooperation Agreement Pilot Project (TCAPP) is a global effort to promote the transfer of climate-friendly technologies to developing countries. Working in Brazil, China, Kazakhstan, Korea, Mexico, Egypt and the Philippines, TCAPP has emerged as the leading model for private-sector driven technology transfer under the UNFCCC. Under TCAPP, country teams develop technology cooperation frameworks that identify priority climate-friendly technologies that will meet development goals and reduce greenhouse gas emissions. In addition, the technology cooperation frameworks identify potential barriers to the deployment of these technologies. TCAPP then works with in-country government agencies, businesses and NGOs to develop and implement actions that will remove barriers and facilitate technology transfer. A key element of TCAPP has been attracting private investment. TCAPP actively engages over 400 U.S., international and local businesses to help develop specific projects and to provide invaluable input regarding the removal of market barriers. Over 10 bilateral and multilateral donors also are working with USAID in this initiative.

World Bank Renewable Energy Support
Location: Global
Agency: USAID
Partners: WBG/GEF
Duration: 1999-2001
USAID partners with the Global Environment Facility to support analytic and programmatic work at the World Bank to encourage the integration of renewable energy projects into its lending portfolio. The objective of this effort is to facilitate a shift of WBG/GEF renewable energy efforts from an individual project basis to larger-scale, longer-term programmatic efforts.

This approach is considered key in "mainstreaming" renewable energy technologies and projects by simultaneously addressing a range of development, climate change and technology improvement objectives, and by heightening the interest of developing country client governments and task managers within the World Bank Group in such projects. Other project support modalities promoted under this effort include the use of in-country intermediaries to assist in identification and execution of projects, and long-term technology financing support tools to establish competitive and sustainable markets for renewable energy technologies.

Harnessing Market Forces to Provide Energy
Location: Regional
Agency: USAID
Partners: Southern Africa Development Community (SADC), Southern African Power Pool (SAPP)
Duration: 1998-2002
USAID and the Regional Center for Southern Africa (RCSA) have developed a collaborative program with SADC and SAPP to promote efficient energy production and consumption. The program provides technical assistance designed to transform Southern African power markets through regional cooperation and the establishment of a SAPP Coordination Center. As a result, regional integration efforts will be accelerated and electricity trade within the SAPP will be enhanced. This program also supports activities in other sub-Saharan Africa regions to strengthen energy institutions and address legal, regulatory and policy issues.

Asia Sustainable Energy Initiative
Location: India, Indonesia, and Philippines
Agency: USAID
Duration: 1998-1999
The Asia Sustainable Energy Initiative assists member countries in mitigating GHG emissions from the energy sector. Under the initiative, the IIE organizes technical training for professionals from India, Indonesia and the Philippines. The training provides participants with a working knowledge of the full range of technical and institutional requirements necessary for the implementation of workable, results-oriented energy labeling programs adapted to their respective countries. The training examines the role of energy efficiency labeling in promoting the manufacture, marketing and purchase of electrical equipment, such as refrigerators, residential air conditioners, lighting systems and motors. As a result of this training activity, it is expected that product standards, testing and labeling programs on electric equipment will be established and/or improved in the participating countries, with potentially significant impacts over the longer term for mitigating energy demand growth rates and reducing gross domestic product energy intensity.

India Zero Emissions Transport
Location: India
Agency: USAID

Partners: Nexant (formerly Bechtel), Bajaj Auto and New Generation Motors
Duration: 1996-2002
USAID is sponsoring activities designed to leverage public and private investments in electric vehicles. A prime objective of the program is to reduce particulate matter and lead in the urban environment.

Utility Partnership Program
Location: India
Agency: USAID
Partners: USEA
Duration: 1997-2002
Funded by USAID, the USEA is implementing the Utility Partnership Program in India. The program's main objective is to provide a mechanism for the U.S. energy industry to transfer its experience in market-based energy production, transmission and distribution to its international counterparts, while providing the U.S. utilities with an opportunity to learn about the energy industry in other countries. The partnership program has established eight partnerships in the country, three of which are regulatory partnerships, and complements USAID/India's regulatory reform activities.

Hemispheric Standards Initiative
Location: Western Hemisphere
Agency: USAID, DOE
Partners: Latin American Organization for Energy Development (OLADE)
Alliance to Save Energy International Institute for Energy Conservation (IIEC), LBNL
Duration: 2002
The Hemispheric Standards Initiative promotes the development of national and regional standards for energy efficiency, with particular focus on domestic appliances. Coordinated with the OLADE, the program receives funding from DOE and is implemented jointly by the Alliance to Save Energy, the IIEC and LBNL.

Increased Use of Renewable Energy Resources in Central America
Location: Regional
Agency: USAID
Partners: E & Co., In-country partners
Duration: 1999-2001
USAID supports the development of renewable energy activities in Central America. These activities focus specifically on enterprise development, next-stage finance, capacity building, policy and regulatory reform in El Salvador, Honduras, Guatemala, Nicaragua and Panama. Cross-cutting activities involve options for off-grid energy deployment, GHG information for project entrepreneurs, and a monitoring and evaluation manual for renewable energy projects.

Renewable Energy Applications and Training
Location: Regional
Agency: USAID,DOE
Partners: Sandia National Laboratories
Duration: 1999-2001
USAID is collaborating with DOE and Sandia to provide technical assistance to analyze, design, purchase, test and install renewable energy systems, and to evaluate the reliability and efficiency of electric power transmission and distribution systems. In addition, this effort supports the sustainable and commercial use of renewable energy in Central America by creating projects based on the USAID/DOE Mexico Program model and provides technical support for the extension of the Mexican Distance Learning Center (Telesecundaria) Program in Central America.

Renewable Energy in the Americas (REIA) Initiative
Location: Regional
Agency: USAID
Partners: Organization of American States (OAS)
Duration: 1999-2001
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USAID is partnering with the OAS to support a Technical Secretariat for the REIA Initiative, which promotes renewable energy and energy efficiency ("sustainable energy") projects throughout Latin America and the Caribbean. The goals of this initiative include reducing GHG emissions from electricity generation, reducing local environmental emissions, increasing electrification of rural areas at a lower cost than grid extension or remote diesel generators, reducing fossil fuel imports, creating local employment and promoting commerce among industries throughout the Americas. REIA promotes sustainable energy through the implementation of activities in three major program areas: (1) Energy Policy and Regulation Support, (2) Technical Assistance and Trade Promotion, and (3) Sustainable Energy Impact Analyses.

Adaptation of the North American Energy Measurement and Verification Protocol to Brazil
Location: Brazil
Agency: USAID
Partners: TBD
Duration: 2000-2001
Investments in energy efficiency usually require an accurate measurement of potential savings and verification of those savings after installation of equipment. Until recently, methodologies for measurement and verification have not been standardized. DOE has sought to address this problem by developing a standard protocol called the North American Energy Measurement and Verification Protocol (NEMVP). USAID is currently working to adapt this protocol to a Brazilian context for the purpose of creating credible business and contractual instruments as well as channels for financing energy efficiency performance contracting. USAID has translated NEMVP into Portuguese and has presented it at a series of ESCO workshops. A working group

will continue the dialogue on the adaptation and adoption of the NEMVP and will issue a first protocol within six months of the workshop.

Renewable Energy Project Support Office (Winrock REPSO-Brazil)
Location: Brazil
Agency: USAID
Partners: Winrock International--REPSO Office in Brazil
Duration: 1995-2003
Through Winrock International, USAID is building a network of NGOs to increase the use of renewable energy in developing countries. Known as Renewable Energy Project Support Offices (REPSO), these in-country facilities are managed by local institutions and are designed to provide the technical and financial assistance necessary to help identify and evaluate renewable energy projects. The REPSO in Brazil is located in Salvador, Bahia and is staffed by Winrock and industry experts to work with cooperatives, NGOs and private companies interested in renewable energy projects. The REPSO-Brazil provides assistance in local market and capacity building, information dissemination, project identification and development, provision of pre-investment study funds, and industry-based training in collaboration with other energy program initiatives. The Brazilian REPSO also supports initiatives in the policy arena. By participating in regulatory public hearings and by providing technical assistance to both the MEE and the ANEEL, several ANEEL regulations supportive of clean-energy technologies were enacted in 1999.

Power Wheeling
Location: Mexico
Agency: USAID
Partners: Comisión Federal de Electricidad (CFE)
Duration: 1998-2002
USAID is working to support a major investigation of the legal, regulatory and environmental factors affecting cross-border trade in electricity between the U.S. and Mexico. Cross-border trading between the two countries could optimize the power generation mix, thereby achieving GHG reductions.

Reduction of Power Station Emissions in Mexico
Location: Mexico
Agency: USAID
Partners: EPRI, CFE
Elements: Investment facilitation
Duration: 1997-2000
USAID is collaborating with EPRI to accelerate transfer of environmental control technologies to Mexico's CFE. The program aims to promote energy efficiency and to introduce low carbon-emitting energy systems through the private sector and public-private partnerships.

Reduction of Refinery Emissions in Mexico
Location: Mexico
Agency: USAID
Partners: PEMEX
Duration: 2000-2002
USAID is collaborating with PEMEX to accelerate transfer of environmental control technologies. The program aims to promote energy efficiency and to introduce low carbon-emitting energy systems through the private sector and public-private partnerships.

5. EET Clean Energy Success Stories

The EET programs not only work toward increased environmentally sustainable energy production and use, but are also strongly linked to social, economic and political development in USAID- assisted countries.

In ***Asia and the Near East***, EET programs help national governments and municipalities solve water, sewerage and solid waste management problems; work with governments to promote cleaner fossil fuel technologies, renewable energy and improved energy efficiency; and promote targeted protection and education programs for natural resources conservation. A major emphasis is linking developing industries with U.S. suppliers of modern, less-polluting technologies. Countries where EET works include Bangladesh, Egypt, Morocco, India, Nepal, Indonesia, Philippines and Sri Lanka.

In ***Europe & Eurasia***, EET's programs promote more economically sound and environmentally sustainable energy systems to mitigate Eastern European and former Soviet Union countries' impact on global climate change. EET programs help these countries reduce carbon dioxide emissions and increase carbon absorption through energy efficiency improvements, and power, oil and gas regulatory reform. Countries where EET works include Armenia, Moldova, Poland, Hungary and Romania.

In ***Latin America and the Caribbean***, EET focuses on supporting clean and renewable energy alternatives, reducing urban and industrial pollution and supporting environmental management. Activities focus on reducing pollution in border areas with Mexico and creating effective environmental regulatory systems to even the playing field under the North American Free Trade Agreement and the proposed Free Trade Area of the Americas. Countries where EET works include Bolivia, Panama, Brazil, Honduras, Ecuador, Jamaica, Peru, El Salvador, Mexico, Guatemala and Nicaragua.

In ***Africa***, while few urban environmental infrastructure or energy activities have been established to date, increased investment is expected to develop Africa's burgeoning cities in a sustainable manner. Countries where EET works include Senegal, Benin, Botswana, Togo, South Africa, Uganda, Ghana, Nigeria, Zambia, Rwanda and Zimbabwe.

Highlights of EET's programs and success stories are provided below.

West Africa Gas Pipeline project. When completed, the $400 million, 600 km pipeline will carry flared gas for export to regional markets, from Nigeria to Ghana through Togo and Benin. The new gas pipeline is the centerpiece of the region's strategy to boost non-traditional exports, diversify industrial structures, create regional markets, and initiate a regional approach to sustainable resource exploration. But successful implementation of the WAGP project requires all four nations--Nigeria, Benin, Togo and Ghana--to complete a series of cross-border agreements and harmonize their respective regulatory environments. This presents EET with a unique opportunity to work with the four countries involved in WAGP and participate in the regional strategy to harmonize energy issues. In 1999, EET worked with USAID/Ghana to design the appropriate intervention to support the WAGP. Next, EET developed a funding proposal that assisted the Ghana mission in obtaining a $1.5 million grant from the Africa Trade and Investment Policy (ATRIP) Program. The grant will assist West African states to develop technical assistance for the gas pipeline project.

The EET is providing technical assistance and working with public and private sector partners in the region to resolve legal, fiscal and environmental issues to facilitate construction of the gas pipeline. EET's assistance will focus on analyzing and resolving the technical and operational issues and economic impacts associated with the project, developing the terms and conditions of pipeline concessional agreements, and strengthening the capacity of governments to negotiate and implement a concession agreement with the private-sector project development team headed by Chevron. Strengthened through technical expertise provided by EET, USAID will play a key role in harmonizing energy issues and in promoting regional cooperation in West Africa.

South Asia Regional Initiative/Energy Program. EET is a key member of the USAID team leading the recently launched energy program under the regional initiative that will bring together energy sector players in South Asia to share experiences and cooperate on energy reform and trade, facilitating a long-term process of rationalizing energy supply and its regional distribution. SARI is a collaborative effort between EET, ANE, missions in India, Bangladesh, Sri Lanka, Nepal, and U.S. and local partners, including U.S. Energy Association, Enron and Unocal. EET played an integral part in designing the energy component of SARI and will provide technical assistance and training to support regional energy development, cooperation and ultimately trade in energy resources among South Asian nations.

Nigeria Energy Sector Reform. The work in Nigeria represents a major opportunity for the U.S. Government to help shape Nigerian economic and energy policy. EET's work began in November 1999 on a scoping mission to Nigeria, which identified a set of high-impact energy interventions to support the energy-sector policies of the newly elected government. In collaboration with BHR/OTI, USAID/Nigeria, officials from the U.S. embassy in Lagos and U.S. Department of Energy's Office of International Affairs, EET team members met with high-level Government of Nigeria officials and initiated a dialogue on needed energy sector reforms. Working with the aforementioned partners, EET successfully developed a $2 million energy assistance program for USAID/Nigeria's Power Sector Reform Program in July 2000. To

implement the program, EET will continue to provide technical assistance to the mission, specifically on improving the management of the Nigerian Electric Power Authority in preparation for unbundling and privatization of its services.

India Zero Emissions Transport (IZET). This program represents an opportunity for reducing vehicle emissions and reducing outdoor air pollution and improving the health of the urban populace in Indian cities. The program was designed to determine the feasibility of electric vehicles for the India marketplace, promote and develop private-private and private-public partnerships, mitigate urban air pollution, and leverage private- and public-sector funds. The primary commercial objective of the electric vehicle program is to determine the technical and economic feasibility of electric two- and three-wheeled vehicles for the Indian market and, assuming a positive response, accelerate the commercialization path for the technology.

The EET is working with the private sectors in the United States and India, on an electric vehicle demonstration program involving two- and three- wheelers and automobiles. India's largest two- and three-wheeler manufacturer, Bajaj Auto limited (BAL) and U.S.-based New Generation Motors (NGM), are working together on the development of an electric vehicle. Bajaj, which is India's leading manufacturer of conventional two- and three-wheeled vehicles with a large network of dealerships, was actively involved in screening electric drive systems for the Indian marketplace. Bajaj committed to providing substantial resources: design, testing, certification, operation, maintenance, oversight of data acquisition and product evaluation. New Generation Motors, an innovative electric drive system manufacturer and integrator in the United States, is the technology provider selected by Bajaj.

The project was designed to determine the technical and economic feasibility of electric vehicles for the India marketplace, promote and develop private-private and private-public partnerships, mitigate urban air pollution, and leverage private- and public-sector funds. About 30 two- and three- wheelers will be field-tested on the streets of New Delhi and Agra for 6 to 12 months. India's first electric automobiles will be rolling off the assembly line by the end of 2001, and IZET prototype electric scooters and auto rickshaws will soon be on the streets of New Delhi. Data acquired from this demonstration program will be analyzed and the lessons learned will be applied toward the next generation of vehicles. India has a vibrant vehicle manufacturing industry that is motivated to introduce and move rapidly towards the commercialization of electric two- and three-wheelers.

Mexico Electric Sector Environmental and Legal Permitting. EET built support within Mexican ministries and the electrical utility CFE for the joint preparation of two handbooks on environmental permitting and legal permitting in the power sector. These two handbooks will provide Mexican and U.S. power developers with better project development tools. This activity is of particular importance to medium- and small-size U.S. developers, since in the past every large developer active in Mexico has been disqualified from a CFE bid due to poor environmental and legal filing practices. The complexity of the permitting and filing process has led a number of U.S. developers to abandon their Mexico activities, resulting in a situation in which the U.S. is now a minor power sector investor in Mexico.

Environmental Clean Up of Mexico's State Petroleum Company. EET succeeded in developing a cost-sharing program to support the environmental clean up program undertaken by PEMEX, Mexico's state petroleum company. This cost-sharing program centers on the demonstration of a clean combustion U.S. technology in one of the boilers of the Franciso Madero refinery, with the goal of increasing efficiency, decreasing pollutants and lowering maintenance costs. USAID and PEMEX chose a modified Reduced Emissions and Advance Combustion Hardware (REACH) technology to upgrade the heavy oil burners at this refinery. The Madero demonstration alone could reduce GHG emissions by 5,200 tons per year. If successful, the solutions identified for the Francisco Madero Refinery could be replicated on all of PEMEX's facilities and could potentially reduce GHG emissions by 142,600 tons per year.

A successful demonstration at the Madero Refinery can also increase the probability of introducing a U.S. (rather than European) combustion technology in all of PEMEX's refineries. The REACH technology was developed by a U.S.-based Electric Power Technology (an offshoot of EPRI). A different design of REACH had been earlier demonstrated in 1999 at another power station in Manzanillo, Mexico. EPT and ALESCO, a Mexican firm, have joined forces to market REACH to other Mexican power plant developers.

Cities for Climate Protection Campaign. EET supports the Cities for Climate Protection Campaign, in which cities in Mexico and the Philippines seek to reduce local greenhouse gas emission by using a five-milestone performance framework. The goal is to establish and test a capacity-building framework in which the local governments are able to acquire the technical and related skills to identify, finance and implement greenhouse gas emissions reduction projects through a Local Action Plan. Cities must first conduct a energy and emissions inventory and forecast, establish an emissions target, develop and obtain approval for the Local Action Plan, implement policies and measures, and monitor and verify results.

In Mexico, the participating local authorities have not only been able to undertake the five milestones of the campaign, but are doing so at a more accelerated rate than in other developing country cities. A number of greenhouse gas emissions reduction measures are already underway in the Philippines. Just a few of the projects presently being implemented in Mexico include waste diversion through recycling in Querétaro and energy efficiency in Tlalpan, Mexico. In the Philippines, projects are focused on retrofitting city buildings and public markets in Cagayan de Oro, streetlight conversion in Cebu, and urban greening in Tagbilaran. The projects in Mexico and the Philippines have helped reduce GHG emissions by 229,646 tons per year (190,832 tons per year in Mexico and 38,814 tons per year in the Philippines).

Practioner-to-Practioner Partnerships. EET works with the U.S. Energy Association through a Energy Partnership Program, setting up utility and regulatory partnerships in USAID-assisted countries. Since 1995, the Partnership Program has established 45 utility partnerships and 70 cooperative partnerships in 20 countries. In the past year, seven new regulatory partnerships have been established in Brazil, Central America, the Dominican Republic, Ghana, Guatemala, India and Indonesia.

Through these partnerships, U.S. organizations have conveyed U.S. experience and business/regulatory practices to other nations. Focus areas have included petroleum exploration, production and transportation, natural gas distribution, and electric power production, transmission, distribution and utilization. The partnerships also include executive exchanges between non-U.S. utility and U.S. utility partners. Executive exchanges are typically established for two-year periods. Six to eight executive exchanges are made per year, divided between U.S. and overseas partners. The project allows for a transfer of knowledge on market-based planning, international energy-sector restructuring, and development experience.

Support to the Ghana Energy Foundation (GEF). Like other developing countries, Ghana is experiencing growing energy demand and the often-accompanying constraints on supply. As part of the government's program to reform the Energy Sector and in response to Ghana's energy crisis of 1998, the Ghana Energy Foundation was formed. GEF is an NGO dedicated to promoting and implementing energy efficiency and renewable energy programs in the country. The GEF is the first institution of its kind in West Africa. SO3 support to the Foundation focuses on four main areas: institution strengthening and NGO development, public education and awareness creation, policy development and reform, and public-private partnership development. Through SO3 support, the GEF conducts energy awareness campaigns through television and radio advertisements. This has induced a huge, positive change in energy use habits of Ghana's citizens, leading to reduced energy consumption and lower electricity bills (by 5 to 20 percent). Working with GEF, Ghana's Ministry of Education has included energy efficiency lessons in the national education curriculum. Five pilot Green Schools are already participating in the energy efficiency education program and the Ministry has planned a national rollout of this program. GEF has also started distributing energy efficiency best practice case studies to stakeholders and consumers. The energy management practices and resulting have also enhanced profitability among industries in Ghana.

The Sustainable Cities Initiative's Municipal Water Efficiency. Municipal water utilities are heavy energy consumers and struggle with how to achieve efficiency in both electricity and water supply and distribution systems. Improving energy efficiency can provide enormous savings in capital expenditures, reduce losses and improve revenue collection. Water efficiency can provide cost savings, wastewater reductions and reduced system demands for water resources. USAID launched the Sustainable Cities Initiative to provide assistance to municipalities in making their energy and water supply and delivery system more energy efficient. The project has worked in four cities in India--Ahmedabad, Pune, Chennai and Indore.

The city of Ahmedabad has reduced peak electricity demand by 11 percent, and the city's maximum demand by more than 8 percent. The project has saved the city over $300,000 in energy costs and has reduced carbon dioxide emissions by 4,650 tons. The Municipal Corporation began an energy management cell (EMC) to help address energy efficiency issues on a more consistent basis. The Pune Municipal Corporation has created an advanced energy use data tracking system that has brought to light an additional Rupees 6.5 million in savings. The Indore Municipal Corporation has created an energy management cell that, after only one month

of work, identified savings of over Rupees 1.6 million for no investment cost and Rupees 3.1 million from improvement in monitoring and tracking of energy usage. In Chennai, the state utility, the Tamil Nadu Electricity Board has instituted a major end-user metering purchase and installation campaign to better track energy use and savings.

The program is using the lessons learned in India in the Brazilian cities of Fortaleza and Campina Grande to implement a consumer awareness campaign to help minimize water usage.

Mexico's National Renewable Energy Program. More than five million Mexicans do not have access to grid electricity in 88,000 villages, while more than 100,000 rural communities are in need of potable drinking water. More than 600,000 ranchers need water for livestock or irritation. Given Mexico's abundant solar and wind resources, these rural needs represent a huge opportunity for SO3 to utilize renewable energy interventions. SO3's Mexico Renewable Energy Program focuses on installing photovoltaic (PV) powered water-pumping systems, with the help of Sandia National Laboratories and FIRCO, an agency under the Mexican secretary of agriculture, that encourages the use of advanced technologies to increase agricultural production. Over the past four years, SO3's partnership with Mexican state and federal organizations and international environmental groups has sponsored nearly 200 PV and wind energy projects in eight Mexican states. These systems provide energy to more than 50,000 people. Moreover, the SO3's renewable energy program not only encourages the use of renewables to increase access to energy but also presents a market opportunity for U.S. companies that manufacture renewable energy technologies and products.

Establishing & Strengthening Non Governmental Organizations. In July 2000 at Praia do Forte Eco Resort, in the state of Bahia, 18 NGOs came together to establish the National Network of Civil Organization for Renewable Energy (RENOVE), a joint initiative of SO3, Winrock International and the USAID Brazil Energy Program. RENOVE joins Brazilian NGOs engaged in rural development specifically in essential activities such as energy, health, education, management and natural resources preservation, gender, capacity building, leadership and human development. These NGOs are carrying out sound programs in rural zones, protected areas in the Amazon region in northern Brazil, Atlantic Tropical Forest in the East Coast, and in the center of the country. RENOVE's objectives are to aggregate the individual strengths and experience of members working in renewable energy and disseminate it to the smaller network members. By providing training and capacity building encouraging formulation of public policies for renewable energy usage providing technical assistance and disseminating lessons learned, identifying credit lines for renewable energy, and supporting fund raising for productive uses of renewable energy, RENOVE joins its members in a strong, unified voice championing the role of renewable energy in improving the quality of life for rural populations.

C. U.S. Department of Commerce

Trade Development / Basic Industries / Energy Division

The International Trade Administration (ITA) had significant accomplishments in trade promotion in the year 2000. In March 2000, ITA launched an International Clean Energy Initiative (ICEI) to link U.S. companies with foreign markets to facilitate sales and dissemination of clean-energy technologies, products and services, and clean fuel sources. The ICEI was designed to promote sales of U.S. products and services overseas.

Over the period September to December 2000, the ICEI resulted in four Clean-energy Trade Missions. Twenty-three companies participated in one or more of the trade missions, which visited Brazil, China, Mexico, and India. Feedback from the over 50 participants was overwhelmingly positive. In Mexico, group meetings were held with members of Mexican President Fox's energy transition team and with the Governor of Nuevo Leon State. In addition, 50 one-on-one meetings with government and private sector officials were held. In Brazil, meetings were held for mission participants with Federal and State Government and private sector energy officials. In India, 85 one-on-one meetings occurred with government and private sector energy officials. In China, each participating company had between 25-35 individual business meetings. In addition, the entire delegation met with important Chinese central government agencies in Beijing and senior provincial government officials.

Participants continue to follow up with business leads formed during the trade missions, and complete mission reports are available at http://www.ita.doc.gov/td/energy/icei.htm.

In March 2001, a fifth Clean-energy Trade Mission took place in Russia with a focus on district heating equipment and efficiency.

D. Environmental Protection Agency

EPA Clean Energy Initiative

Energy use is fundamental to economic activity - powering our homes, businesses, and transportation systems. Increased economic growth has historically been fueled primarily by energy produced from fossil fuels, with the unintended consequence of increased air pollution and an increased threat of climate change. A wide array of economically viable and environmentally preferable clean-energy technologies are available today, with more under development. These technologies can effectively break the link between increased energy use and harmful air emissions.

Through its Clean Energy Initiative, EPA is promoting a variety of technologies, practices, and policies, with the goal of reducing greenhouse gas emissions associated with the energy supply sector. EPA has a three-pronged strategy that includes: (1) influencing markets for renewable energy; (2) working with State and local Governments to develop policies that favor clean-energy; and (3) facilitating combined heat and power (CHP) and other clean "distributed generation" technologies in targeted sectors. This effort initially targets a handful of state markets. As EPA gains success, we will expand our efforts to other markets.

For example, a key component of EPA's renewable energy initiative involves working with key businesses and local governments in targeted states to facilitate bulk purchases of "green" power. This involves forming partnerships with organizations that are working to set green power standards, providing widespread recognition of green power purchases, and quantifying the environmental benefits associated with green power purchases. Similarly, EPA is targeting small- and medium-sized CHP applications by identifying candidate industrial and commercial hosts in targeted state markets. We are providing these companies with information about the efficiency gains and improved environmental performance of CHP, as well as technical assistance.

(Contact: Tom Kerr, Chief, Energy Supply and Industry Branch, EPA/OAR/OAP/CPPD, 202-564-0047)

E. Export-Import Bank

The Charter of the Export-Import Bank (Eximbank) has congressionally mandated support for environmentally beneficial exports. Beginning in 1994 through a variety of credit mechanisms, including short, medium, and long-term credit as well as credit insurance, the Eximbank has actively promoted sale of environmentally beneficial U.S. products overseas. Eximbank has environmental standards and guidelines that it applies to each project it considers under its loan and guarantee programs. Eximbank's environmentally beneficial export program consists of a proactive business development approach and enhancements offered to existing Bank programs. For example, the maximum Organization for Economic Cooperation and Development (OECD) repayment term for long-term loans and guarantees of 10 to 12 years after project completion can be offered to environmental projects. Furthermore, interest can be capitalized during construction of the projects. Eximbank's Carmel, a beneficial export program, has been growing since its inception. In 1994, 13 projects were approved. By the year 2000, 65 projects totaling over $1.2 billion were part of the Bank's environmentally beneficial export program.

Of the many projects Eximbank has been involved with, several illustrative examples are offered below. These examples show how different credit mechanisms and enhancements have been used by Eximbank to promote clean-energy technology export projects.

- Made a $12.5 million loan for three ZOND wind energy projects in China in order to match a Danish soft loan offer. Eximbank's activities allowed the Chinese to make their selection of technology based on quality and appropriateness of application and not strictly on economics and finance. The U.S. company ZOND did win the contract.

- Provided a write-down of interest for U.S. firm to win a $5.2 million contract for environmental monitoring stations in China.

- Provided loan enhancements that allowed a Milwaukee firm to win an $8.2 million contract for a desalinization plant in Aruba.

- Using its repayment insurance program, Eximbank allowed the financing of a tire recycling facility in Mexico for a U.S. firm at a value of $2.35 million.

- Using its medium-term insurance program, Eximbank allowed the financing of a $400,000 ZOND wind system for a cement plant in Mexico.

- *Kyocera Solar* of Scottsdale, Arizona is using Short-Term Insurance to offer a $100,000 open account credit line to *Kenital, Ltd.*, of Nairobi, Kenya. Kenital is using the credit line to purchase photovoltaic solar home systems.

F. Overseas Private Investment Corporation

The Overseas Private Investment Corporation (OPIC) is an independent agency whose mission is to mobilize and facilitate the participation of U.S. private capital and skills in the economic and social development of less developed countries, and countries in transition from non-market to market economies. In carrying out this mission, OPIC's finance, political risk insurance and investment funds programs support a wide range of investments in over 140 developing countries. All OPIC projects support the U.S. economy, contribute to the economic and social development of the host country, protect the rights of workers, and safeguard the environment. All OPIC projects meet World Bank environmental, health and safety standards, and OPIC carefully monitors projects in its portfolio to ensure ongoing compliance with these standards.

Power Sector Investments

The power sector accounts for approximately 30 percent of OPIC's portfolio. OPIC supported 52 power projects with a total capacity of 16,775 MW between 1990 and 2000. Nineteen gas projects with a total capacity of 7,363 MW account for 44 percent of OPIC's power portfolio based on capacity. Renewable energy projects, including 11 hydroelectric (4,080 MW), for the most part all preexisting or run-of-river facilities, and four geothermal projects (585 MW), make up the second largest group at 4,665 MW, accounting for 28 percent of the power portfolio. Thus, the preponderance of OPIC-supported power projects, 72 percent by capacity, are fueled either by natural gas or renewable energy sources. The remainder of the portfolio consists of four coal-fired (3,534 MW) and nine oil-fueled power plants (1,214 MW), representing 21 percent and 7 percent of capacity, respectively. Some of the coal-fired plants involve the acquisition and modernization of existing facilities and do not involve incremental increases in GHG emissions.

In fact, the fuel mix of OPIC's power portfolio consists of significantly more gas (44% vs. 13.6 and 17 %) and renewables (28% vs. 26% and 21%), and less coal (21% vs. 43.1% and 36%) and oil (7% vs. 13.6% and 9.3%) than the prevailing fuel mix of the developing world or the global electricity sector. In addition, approximately 43% (by capacity) of OPIC-supported fossil fuel-fired plants utilize combined-cycle technology, the most energy efficient fossil fuel-based power generation technology. As a result, when compared with the current power sector fuel mix in these regions, OPIC's power portfolio may be seen as helping drive investment in gas-fired and renewable projects.

Natural Gas Investments

In "Natural Gas: Bridge to a Renewable Energy Future", the Renewable Energy Policy Project argues that a transition to natural gas is an important intermediate step on the road to a renewable energy future. OPIC has supported several projects that bring clean burning natural gas to new regions and markets around the world, including a gas liquefaction (LNG) facility, an LNG gasification plant, three new gas pipelines and two investments in large pre-existing gas pipeline systems since 1990.

Partnerships for the Environment

As part of its continuing efforts to promote environmentally friendly private investment in projects in developing countries, OPIC has established partnerships with U.S. Government agencies and non-governmental organizations (NGO) to enhance its ability to support environmentally friendly projects, including eco-tourism, low cost housing, and renewable energy.

As part of this effort, OPIC entered into a partnership with USAID to complete OPIC's first loan commitment to a non-governmental organization, Washington, D.C.-based Counterpart International, Inc. and World Women in Defense of the Environment. Counterpart International, Inc. will use the $1 million in financing to establish a facility to on-lend OPIC funds to environmentally friendly projects and existing businesses to promote environmentally focused small-and medium-sized enterprises in the Philippines. The facility will be comprised of up to $750,000 in a direct loan from OPIC and up to $250,000 in grant monies from USAID that will be administered by OPIC. Proceeds of the OPIC loan will be used for investments in business ventures in the Philippines that meet OPIC's environmental and other policy criteria. Up to five investments are anticipated, involving activities such as organic fertilizer manufacturing, eco-tourism, and low cost housing using recycled materials.

OPIC also signed a Memorandum of Cooperation with the Department of Energy (DOE) "affirming their intent to facilitate financing that will promote the development of sustainable energy projects in Africa." Accordingly, OPIC and DOE will design the "U.S.-Africa Sustainable Energy Program" to provide assistance to U.S. not-for-profit entities, NGOs, and U.S. small business entities or cooperatives interested in developing sustainable energy projects in Africa. The program will target projects that (i) support community-based sustainable energy development, (ii) increase energy access and bring clean-energy systems to underserved/unserved areas using renewable technologies and natural gas-fired systems, (iii) reduce greenhouse gases through programs that promote enhanced supply, renewable sources, or demand-side management, and/or (iv) promote the application of clean-energy technologies.

Harmonization of Environmental Standards

In addition, OPIC has taken a lead role in efforts to harmonize environmental standards among bilateral finance, investment insurance and export credit agencies. OPIC has encouraged its foreign bilateral agency counterparts, as well as its private sector partners, to recognize the importance of the environment to the long-term viability of the projects they support and to integrate environmental considerations into their investment decision-making. Over the last year, OPIC continued its ongoing efforts to promote harmonization of environmental standards through meetings with our foreign bilateral counterparts in Germany, The German Investment and Development Company (DEG) and Kreditanstalt fur Wiederaufbau (KfW), as well as with representatives of the Japanese Export-Import Bank (JEXIM) and the Export Development Corporation of Canada.

Finally, it is important to consider that OPIC-supported projects generally achieve significant supplementary benefits for the environment when compared to other sources of finance or insurance. OPIC projects are required to meet high environmental performance standards that generally exceed host country environmental requirements. OPIC often requires annual monitoring reports and third party independent compliance audits and conducts site visits to ensure ongoing compliance with all its environmental requirements. In addition, OPIC often is involved in the privatization of existing power plants. Such projects typically involve significant environmental performance improvements - often through the installation of expensive environmental control technologies like electrostatic precipitators or flue gas desulfurization units. As a result, OPIC-supported projects are generally among the cleanest, most efficient projects in the developing world.

G. U.S. Trade and Development Agency

The U.S. Trade and Development Agency (TDA) is an independent Federal agency that helps American companies develop commercial opportunities in emerging markets. To achieve this mission, the agency invests in feasibility studies, training grants, technical assistance, orientation visits and deal-making conferences.

Electric Power Projects

Electricity is a basic building block of economic growth. Brownouts, production slow-downs, and factory closures plague countries that have insufficient capacity to generate and distribute electricity. Because of this need, electricity and power projects have always been at the core of TDA's program. In 2000, TDA invested in 76 new energy and power activities.

Recent TDA-supported electric power projects include:

Africa & Middle East

Algeria Hadjret En Nouss 2x600MW IPP--In August of 1998, TDA awarded its first grant to Algeria in over 10 years when the agency approved a $562,000 grant to Sonelgaz for feasibility study and tender assistance on the development of the country's first 1200MW independent power project. The project is the first of three IPP power plants slated to be built. Selection is in progress for a U.S. company to perform the study.

Morocco Khouribga Cogeneration--TDA is providing a $252,000 feasibility study grant to the Office Cherifien des Phosphates for the proposed cogeneration and phosphate-drying plant project. Black & Veatch of Overland Park, Kansas, is conducting the study, which was completed in early 2000.

Djibouti Assal Geothermal Power Project--TDA has provided a $90,000 grant to Electricite de Djibouti to share in the cost of a feasibility study on a geothermal project being developed by Geothermal Development Associates of Reno, Nevada. The study is was completed in late 2000.

Asia & Pacific

Philippines Distribution Automation and Network Management Projects--TDA provided $350,000 in technical assistance to address the equipment specifications and to help develop requests for proposals for the distribution automation master station and field equipment, and the integrated telecom and datacom network management system. This technical assistance is being provided by Utility Consulting International of Cupertino, California. The work was completed in mid-2000.

Thailand North Bangkok Repowering Project--TDA provided a $525,000 grant to the Electricity Generating Authority of Thailand for a feasibility study on the conversion of a

237.5 oil-fired conventional thermal plant to a gas-fired power plant using modern gas turbine combined cycle technology. Contractor selection for the study is currently under way.

Central & Eastern Europe

Poland Industrial CHP Gas Turbine Conversion Feasibility Study--TDA provided a $194,534 grant to Polish Energy Partners to partially fund an industrial combined heat and power plant gas turbine conversion feasibility study. Wilton InterPower of San Diego, California, is conducting and sharing in the cost of this $389,067 study, which was completed by mid-2000.

Slovak Republic Vojany Plant Repowering--TDA signed a grant with Slovak Electric (SE) for a feasibility study to re-power and restructure the 1320 MW Vojany power plant. SE wants to discontinue the use of imported coal and fuel the plant entirely with natural gas, adding new gas turbine sections to increase overall capacity. Parsons of Reading, Pennsylvania, was selected to perform the study, which was completed in December 2000.

Bosnia SCADA Systems Feasibility Study--TDA provided a $328,200 grant to the Joint Power Coordination Center for Bosnia's three Elektroprivreda power utilities for a SCADA (Supervisory Control and Data Acquisition) system. SCADA would decrease costs and improve efficiency of Bosnia's power generation, distribution and transmission systems. Electrotek Concepts Inc. of Arlington, Virginia, was competitively selected to perform the feasibility study, which was completed in the spring of 2000.

Europe Regional Trans-Balkan Transmission--System Interconnection--TDA provided a $302,700 grant to ESM, the National Power Company of Macedonia, for a feasibility study that would develop a transmission interconnection system from Bulgaria through Macedonia to Albania. ECT Europe, Inc., an Enron company, contributed $80,000 to the cost of the study. The study is nearly complete, and all the parties to the project are actively considering implementation options.

Latin America & Caribbean

Brazil Electric Utilities Energy Efficiency Programs--TDA funded an orientation visit for officials representing eight electric utilities in Brazil. The delegates presented their planned investments in energy efficiency programs at a business briefing in Atlanta in October 1999. ICF Consulting of Fairfax, Virginia, organized the visit for TDA.

Chile Calama Wind Farm--TDA has approved a $275,000 grant to CODELCO to fund a feasibility study for the development of a 37.5 MW wind farm to be located near the city of Calama in the desert region of Antofagasta in northern Chile. SeaWest of San Diego, California, was selected to perform the feasibility study. A final report is expected in early 2002.

Peru Ocoño Hydroelectric Power Project--TDA is providing $324,000 to partially fund a feasibility study on a hydroelectric power project being developed at the Ocoño Power Corporation S.A., a privately owned facility. Once constructed, the facility will generate an additional 50 MW of electricity. Harza Engineering Company International, L.P. of Chicago, Illinois, has been selected to carry out the study.

New Independent States

Ukraine District Heating--TDA provided a $626,000 grant for a feasibility study on upgrading the Kiev district heating system. Joseph Technology of Woodcliff, New Jersey, conducted the study. The World Bank has approved financing for the project, and procurement is currently under way.

Oil and Gas Projects

TDA is aggressively pursuing energy projects that represent millions of dollars in investment and export potential for U.S. companies. Over its 18-year history, TDA has provided more than $55 million for feasibility studies and related activities in support of American involvement in oil and gas development projects around the world. Total U.S. exports associated with these investments exceed $2.5 billion.

Recent TDA-supported projects in the oil and gas sector include:

Africa & Middle East

Nigeria Domestic Gas Utilization Study - TDA is providing $400,000 to the Nigeria Gas Corporation (NGC) for a feasibility study to examine the best markets and uses for presently flared Nigerian natural gas, in particular pipeline extension and increased gas use for power generation, LPG and compressed natural gas (CNG). Bids for the selection of a U.S. company to perform this feasibility study are currently being reviewed.

Mauritius Petrochemicals Storage Environmental Review - TDA is providing a $208,400 grant to the Mauritius Marine Authority to contract with a U.S. company to review the environmental and safety issues surrounding the current storage of petrochemicals at Port Louis and to plan any needed changes. The Houston, Texas, branch of Lloyds Register Shipping has been selected to conduct the study, which should be completed in early 2001.

Asia & Pacific

Energy South Asia Conference--In March of 2000, TDA is hosting a regional conference in Kathmandu, Nepal, to highlight the market opportunities in the SAARC region's energy sector. Senior policymakers and project developers (both public and private) from Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka will participate in the conference, along with key government officials and business leaders from the United States. In addition to seminars and discussions on issues currently facing the development of the industry, approximately 30 projects with a combined investment value of over $15 billion will be presented.

Bangladesh Strategic Gas Utilization Study--In response to a request by the government of Bangladesh through the Ministry of Mines and Energy, TDA has approved a $400,000 grant to support a feasibility study to evaluate alternatives and make recommendations for specific projects that could utilize the country's gas reserves to maximize economic benefits for Bangladesh. James Chemical Engineering of Groton, Connecticut, is currently carrying out the study, which is expected to be completed by the summer of 2000.

Korea Clean Coal Technology Orientation Visit--TDA is sponsoring the visit of four senior officials from the Korean Electric Power Corporation to the United States. The delegation will visit U.S.-designed and built integrated gasification combined cycle power plants.

Hong Kong - June 2001
Asia Regional Air Pollution Control Technology Conference--The objective of this two-and-a-half day event being co-sponsored by TDA and the U.S. Asia Environmental Partnership is to match U.S. technology and know-how with Asian project sponsors interested in using air pollution control technology (APCT) to meet economic and environmental protection goals. The conference will serve as a forum to present regional APCT project opportunities and for one-on-one meetings between U.S. firms and Asian project sponsors. The following countries will be targeted for the conference: Hong Kong, Malaysia, Taiwan, India, Indonesia, Korea, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.

Central & Eastern Europe

Bulgargaz Gas Storage Facility--TDA awarded Bulgargaz with a $276,000 grant for a feasibility study on an underground gas storage facility. This study is being performed by a consortium of the University of Oklahoma and ECT Europe, an Enron subsidiary based in Houston, Texas, which is contributing $276,018 to the study.

Latin America & Caribbean

Venezuela Gas Recovery--TDA is funding a $375,000 feasibility study on the recovery of low pressure natural gas and hydrocarbon vapors at MARVEN oil fields. Raytheon Engineers and Constructors of Arlington, Virginia, is conducting the study, which is expected to be completed in the first quarter of 2000.

APPENDIX 1

TERMS OF REFERENCE FOR THE CLEAN ENERGY TECHNOLOGY EXPORTS WORKING GROUP

Mission: To increase the share of U.S. clean-energy technologies in international markets by improving the U.S. Government role in catalyzing, facilitating, and assisting private sector efforts.

Premise of Operation:
The barriers to the sale of clean-energy technologies in foreign markets are not unique to U.S. technologies. However, many foreign governments have a different approach to promoting the export of clean-energy technologies. Many developed nations, such as the countries of the European Union and Japan, focus on interagency collaboration with industry to increase market share. In some instances, U.S. technology faces competition from countries that have elevated this activity to a ministry-level function, which heavily supports their domestic industries.

The creation and operation of the Clean Energy Technology Exports Working Group (CETEWG) will be vital to the development and implementation of a successful U.S. clean-energy technology export strategy. The CETEWG will be accountable for three basic responsibilities:

1) To create and manage an effective working relationship with the appropriate U.S. Government agencies to implement actions to achieve the mission.

2) To create, determine, and review the processes through which government and the private sector can work together effectively to achieve the mission.

3) To develop and implement an integrated clean-energy export program by: identifying prime international markets; working with selected countries or regions to analyze local market demand; and providing practical and appropriate solutions through the utilization, purchase, and implementation of U.S. clean-energy technology.

APPENDIX 2

DRAFT ELEMENTS FIVE-YEAR STRATEGIC PLAN FOR A CLEAN ENERGY TECHNOLOGY EXPORTS PROGRAM

The FY 2001 Report of the Energy and Water Development Appropriations Bill requested that several steps be taken to increase international opportunities for the export and deployment of advanced clean-energy technologies. Regarding the development of a strategic plan, the Report states:

"*The Administration should analyze technology, policy, and market opportunities for further international clean energy program development and provide Congress with a 5-year strategic plan by June 1, 2001. This plan should be developed in consultation with the advisory panel.*"

Strategic plans can vary significantly in their format and coverage. "Classic" strategic plans cover a number of topics such as stakeholder analysis, trends, strengths, weaknesses, planning assumptions, mission, vision goals, objectives, strategies, performance measures, etc. The Government Performance and Results Act (GPRA) reinforces the importance of establishing and reporting on performance measures to determine progress toward objectives.

It is important that this first-time international strategic plan maximizes readability and communication value, and does not overly distract the reader with things that are obvious and accepted. The plan should be concise and cover the following areas:

- ***Background/Situation Analysis***: This section provides background to help the reader understand where the opportunities for exports of clean-energy technology are likely to be greatest, where benefits in addition to trade (e.g., energy security, environment) are a consideration, and potential barriers to U.S. exports. Selected figures from DOE's International Annual Energy Outlook will be used to show key trends. A table will be developed that shows major countries/regions, market potential, and key constraints to exports.

- ***Broad Objectives***: Objectives would encompass the major thrusts for increasing U.S. exports of clean-energy technology. These thrusts, for example, could include:

  - helping foreign decision-makers to understand and appreciate the merits of deploying clean-energy technology;
  - helping countries to develop a legal/regulatory structure that will foster a business environment consistent with accepted (international) U.S. practices and motivate the use of clean-energy technology;
  - assisting foreign businesses in obtaining financing and U.S. firms in dealing with the risks associated with doing business in other countries.

- **$** ***Strategies Supporting Objectives***: Strategies will reflect the proposed major approaches of the cognizant government agencies to meeting the different objectives. Where possible, they will identify regions, country groups, or key countries that are the primary focus, and identify the lead government agency(ies) and other partners. Examples of such strategies might include:

    - **S** Implement the "U.S.- China Energy and Environment Cooperative Initiative" to promote rural electrification, urban air quality, clean-energy sources, and energy efficiency (DOE, EPA, DOC, OSTP);
    - **S** Exchange information and conduct workshops to reduce the likelihood and potential impacts of oil spills in the Caspian Sea and Pacific/West Africa regions (DOE, Coast Guard);
    - **S** In countries where basic regulatory and market structures are taking hold, foster the development of small, high quality clean-energy projects through innovative financing approaches such as bundling projects into packages and leveraging local capital with foreign investment (DOE, USAID, World Bank, multilateral development banks);
    - **S** Undertake capacity building activities in Sub-Saharan Africa, with initial focus on helping countries such as Nigeria with significant energy resources to establish an effective free market-based energy infrastructure (DOE, USAID, DOC);
    - **S** Implement, with other APEC economies and the private sector, an initiative to promote the accelerated investment in natural gas infrastructure and trading networks in the APEC region (DOE, APEC);
    - **S** Work with India to combust their domestic coal resources more efficiently and cleanly find commercial markets for the ash byproducts.

- **$** ***Performance Measures Supporting Objectives:*** Federal agencies are increasingly seeking to measure performance in meaningful ways and report on this performance. Establishing "fair" performance measures, especially ones that reflect the outcomes (e.g., increased exports of clean-energy technology) of Government-supported activities, is difficult because there are often many factors that a government cannot control that affect outcomes. Nevertheless, there should be an effort to include measures that reflect program progress and can be readily measured.

<u>Organization of the Plan</u>

Strategic plans are commonly organized by objectives. For this international strategic plan, consideration should also be given to other alternatives, such as organization by region (e.g., Latin America, Africa, etc.), or by clean-energy market (e.g. coal power, renewable energy, etc.).

Process

While DOE, USAID, and DOC were identified in the congressional language as co-chairs for the requested international planning activities, DOE, per discussion with congressional staff, will coordinate development of the deliverables.

A key aspect of the international planning process laid out by Congress is the formation of an advisory panel drawn from the "private sector and other interest groups." DOE is continuing to explore options for an advisory panel, including an advisory panel established under the FACA, and other types of consultative mechanisms that would permit DOE to obtain information and views from private sector companies, academic institutions, non-governmental organizations and other private interests, as well as Federal and State Government agencies, on a wide range of issues pertaining to the export of clean-energy technologies. Based on discussions with participating agencies and the advisory panel (once formed), and consultation with Congress, a deadline for completing the strategic plan will be developed.

Public input will be sought from other sources. For example, comments on the draft strategic plan will be solicited via the internet.